
**MONETARY
ARRANGEMENTS
for New Zealand**

Peter Hartley

NEW ZEALAND BUSINESS ROUNDTABLE
May 2001

The New Zealand Business Roundtable is an organisation comprising primarily chief executives of major New Zealand businesses. The purpose of the organisation is to contribute to the development of sound public policies that reflect overall New Zealand interests.

First published by the New Zealand Business Roundtable,
PO Box 10-147, The Terrace, Wellington, New Zealand
<http://www.nzbr.org.nz>

ISBN 1-877148-68-7

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Design and production by *Daphne Brasell Associates Ltd*
Typeset by *Chris Judd, Auckland*
Cover photograph by *Julia Brook-White*
Printed by *Astra Print Ltd, Wellington*

CONTENTS

List of Figures	iv
About the author	v
Acknowledgements	vi
1 Introduction and overview	1
1.1 Abandoning the New Zealand dollar	2
1.2 Government review of monetary policy	4
1.3 What, if anything should be done?	7
2 Conduct of policy under current arrangements	9
2.1 Inflation as a policy concern	10
2.2 Short-run real effects, and long lags	17
2.3 Strict and flexible inflation targeting	21
2.4 New approaches to monetary policy?	36
3 Alternative monetary arrangements	39
3.1 Monetary policy and globalisation	39
3.2 Monetary union	42
3.3 Dollarisation or a currency board as long-run goals	50
3.4 Competitive base money supply	57
4 Conclusion	65
5 Appendix: Monetary policy and the economy	69
5.1 What can the Reserve Bank control?	69
5.2 Money, real interest rates and output	73
5.3 Inflation and interest rates in an open economy	96
6 References	113

LIST OF FIGURES

2.1	Targeting the inflation forecast	34
5.1	Employment effects of a minimum wage	80
5.2	Adjusting the quality of a job	82
5.3	Effects of an increase in the money supply level	104

ABOUT THE AUTHOR

Peter Hartley is Professor of Economics and chairman of the Department of Economics at Rice University, Houston, Texas. He was formerly an Assistant Professor of Economics at Princeton University. He studied mathematics and economics at the Australian National University before completing a PhD at the University of Chicago. He has published articles concerning monetary economics, monetary and fiscal policy, taxation, exchange rate fluctuations, foreign investment, health insurance, the roles of competition, regulation and ownership in the electricity, telecommunications and airlines industries, privatisation, labour markets, environmental economics and the economic analysis of legal issues. Previous works by Peter Hartley for the New Zealand Business Roundtable are the report *Controlling Crime in New Zealand* (1996) (with Cathy Buchanan), *Conservation Strategies for New Zealand* (1997) and *Equity as a Social Goal* (2000) (with Cathy Buchanan).

ACKNOWLEDGEMENTS

Valuable comments on an earlier version of this study were received from David Archer, Tyler Cowen, Greg Dwyer, Alan Gibbs, Arthur Grimes, Roger Kerr, Martin Lally, Struan Little, Grant Scobie, Ted Sieper, Christopher Smith and Bryce Wilkinson. Their advice was not always followed, however, and the author takes full responsibility for the final product.

INTRODUCTION AND OVERVIEW

The issue of the best monetary arrangement for New Zealand was debated extensively at the end of the 1980s. The resulting Reserve Bank of New Zealand Act 1989 and the relatively light-handed regulation of the commercial banking sector were regarded by many economists as among the major achievements of the New Zealand institutional reform process of the 1980s and early 1990s. Many other countries have followed New Zealand's lead and have re-constituted their monetary institutions along similar lines. The reformed Reserve Bank of New Zealand (the Reserve Bank) has reduced inflation in New Zealand to low levels. New Zealand would appear to be facing more pressing problems than once again altering the institutional arrangement for supplying money. Several events have occurred, however, to re-open the issue.

A number of authors have questioned recently whether New Zealand would be better off abandoning its own currency by forming a monetary union with Australia or by adopting the US dollar as the domestic currency. The motivation for these suggestions is a conviction that New Zealand may be better able to take advantage of new international trading and investment opportunities by changing its currency regime.

The other reason for re-examining the issue of the best monetary arrangement for New Zealand is that the government has announced a review of the operation of monetary policy. The motivation for this review is said to be that because New Zealand is no longer in "a period of transition to sustained price stability", monetary policy can be reviewed to judge "its effectiveness in contributing to broader social and economic objectives". In Chapter 2 we re-examine arguments that have been offered for the current inflation targeting policy of the Reserve Bank. We also consider whether alternative operating procedures may deliver superior outcomes.

We refer to 'monetary arrangements' in the title of this work because our discussion will extend beyond analyses of the conduct of monetary policy by the Reserve Bank of New Zealand. In Chapter 3 more radical alternatives to current arrangements are discussed. We focus specifically on replacing the existing New Zealand currency with a new joint currency circulating in both Australia and New Zealand or adopting the US dollar as the domestic currency. While currency union with another country appears to concern only the foreign exchange market, it would have profound effects on domestic monetary policy. Another radical monetary arrangement considered in Chapter 3 is the removal of the government monopoly over the supply of currency and bank reserves.

Chapter 5 provides background material for the remainder of the report. It discusses a number of theories of the way monetary policy affects the New Zealand economy. The design of monetary policy is difficult because there is, as yet, no universally accepted view of how monetary policy may affect the economy. Chapter 5 summarises the

author's views on these issues. The material in Chapter 5 is more technical than the remainder of the discussion and could be skipped by non-specialist readers willing to forgo some justification for arguments presented elsewhere in the report. For this reason, it is presented as an appendix to the main argument.

1.1 Abandoning the New Zealand dollar

In recent years, there has been renewed interest¹ in 'currency boards' following the adoption of the US dollar as the base of the monetary system in Argentina, Hong Kong and Estonia. Under a currency board, the domestic money base (the total outstanding liabilities of the central bank) is 100 percent backed by currency reserves of some other country and the exchange rate between the domestic currency and that foreign currency is fixed. In addition to providing a domestic medium of exchange, the central bank provides a lender of last resort facility with its associated prudential functions. Some countries have looked favourably upon the experience of Argentina in particular, which is the largest economy to have implemented such an arrangement to date. The Argentinian currency board has been in operation since 1991.

Another emerging trend is so-called 'dollarisation'.² In this case, one country effectively uses the currency of another country as its local currency, as Panama has done with regard to the US dollar since 1904. Dollarisation can also occur to some extent through a market process as citizens trying to avoid a depreciating local currency come to accept a foreign currency as a means of payment. This occurred in Israel when it suffered rates of inflation above 100 percent per year and is happening today to some extent in eastern Europe and northern Mexico. Ecuador decided to dollarise this year, while groups in Mexico (including the Mexican bankers' association) have suggested that official dollarisation might be preferable to retaining the Mexican peso.

If New Zealand were to adopt a foreign currency as its monetary standard, it would gain the maximum reduction in transactions costs by choosing a currency that is widely used to finance international trade and commerce. Thus the US dollar, the Japanese yen or the Euro are the only reasonable candidates. Of these three, the US dollar is the most logical choice. As Grimes, Holmes and Bowden (2000) point out, among these three economies the United States is the largest trading partner of New Zealand, while much New Zealand trade with third countries is also denominated in US dollars. Business cycles in

¹ This is a "renewed interest" because the idea of a currency that is used by more than one nation is not new. For example, the Pacific franc is essentially a locally issued version of the French franc, while both Australia and New Zealand once used a locally issued version of the pound sterling as their currency. In Panama, all bank notes are US dollars and only the coins, called Panamanian dollars, are locally issued. In earlier times, the Spanish dollar was once used widely as an international currency, although the New South Wales colonial authorities, for example, punched a hole in the coins to make the resulting 'holey dollar' and 'dump' unsuitable for re-export.

² Although the foreign currency need not be the US dollar, 'dollarisation' is used generically to cover any displacement of a domestic currency by a foreign one.

New Zealand also appear to be more highly correlated with cycles in the United States than with cycles in either Japan or Europe.

New Zealand could also abandon the local currency by forming a monetary union. In a monetary union, two or more countries agree to form a new central bank, such as the joint European Central Bank (ECB), that issues a single currency, such as the Euro, under a set of tightly specified rules that are mutually agreeable to the countries concerned. Representatives from each of the participating countries sit on the board of the new central bank. Grubel (1999) has recently proposed that the North American Free Trade Agreement (NAFTA) countries (the United States, Canada and Mexico) form a monetary union along the lines of the ECB.

Recent publications by Hargreaves and McDermott (1999), Grimes *et al* (2000) and Coleman (1999) have stimulated discussion of New Zealand forming a monetary union with Australia, or adopting the US dollar as a local medium of exchange. These publications provide excellent summaries of the economic literature on the advantages or disadvantages of monetary unions, currency boards or dollarisation. The papers also present new evidence relating to the New Zealand economic situation.

The purpose of this report is not to provide another review of the literature, or even to comment in detail on the papers mentioned above. Rather, our intention is to discuss the issue of monetary union or a currency board for New Zealand in the context of monetary policy more generally.

In particular, the papers mentioned above focus on the consequences for foreign trade and investment, and international economic integration of currency globalisation. The issue of abandoning the New Zealand dollar as a monetary standard is closely related, however, to determining the most desirable monetary arrangement for New Zealand. Specifically, a monetary union, a currency board or dollarisation would replace the current institutional framework for conducting monetary policy in New Zealand. As Svensson (1997) noted:

The monetary reforms in New Zealand and the explicit inflation target have so impressed the world that they have become contagious. During the 1990s several other countries, namely Canada, Britain, Sweden, Finland, Australia and Spain, have followed the New Zealand example and also introduced explicit inflation targets. In Europe there has also been a wave of institutional reform of monetary policy, giving central banks a clear mandate to pursue price stability, considerable operational independence, and in several cases increased accountability. It is therefore no surprise that Windy Wellington has become something of a Mecca for monetary economists.

If the current institutional arrangement for monetary policy in New Zealand is so highly regarded, one has to ask why New Zealand would want to abandon it. This is not to say that the existing arrangements cannot be improved upon. In order to see if improvements are possible, however, one must consider whether the objectives of monetary policy in New Zealand are appropriate, and whether the operating procedures of the Reserve Bank are as effective as they could be.

1.2 Government review of monetary policy

An examination of the objectives and operating procedures of the current monetary policy framework in New Zealand is also relevant to immediate policy concerns. The government has decided to review “ways of enhancing the Reserve Bank’s ability to implement the Policy Targets Agreement”. The issues to be considered by the review were spelled out in the press release announcing it:

- The way the Reserve Bank interprets and applies the inflation target set out in the *Policy Targets Agreement* with a view to ensuring that this approach to achieving medium term price stability is consistent with avoiding undesirable instability in output, interest rates and the exchange rate.
- Whether the Reserve Bank has an adequate range of instruments and is using its current instruments effectively in altering monetary conditions in the desired direction.
- The range of sources, availability, type and timeliness of data, and the impact of these variables on forecasting and decision making.
- Whether the policy decision making process and accountability structures promote the best outcomes possible.
- The co-ordination of monetary policy with other elements of the economic policy framework, including an evaluation of the relationship between monetary policy operations and other Reserve Bank functions such as prudential oversight of financial institutions.
- Whether the Reserve Bank’s communication of monetary policy decisions to the public and financial markets is as simple, clear and effective as possible.

Many of these issues are discussed in Chapter 2. We begin by re-considering the argument for making price stability the sole target of monetary policy. The price stability objective of monetary policy, as set out in section 8 of the Reserve Bank of New Zealand Act 1989, has been explicitly excluded from the government’s review. It nevertheless may be worth reiterating why such an objective was established in the first place. As the vigorous debate in New Zealand over the goals and objectives of monetary policy recedes into the past, people may forget the intellectual basis for the current institutional framework. While we agree that monetary policy can affect output, investment, employment and other real variables we argue that these are not appropriate alternative targets for monetary policy. The desire to avoid instability in output and other variables can be viewed as a constraint on monetary policy rather than a competing goal.

In addition, if price stability ought to be the sole target of monetary policy, then proposed changes in monetary institutions ought to be evaluated, at least in part, for their implications for price stability. As we noted above, the discussion of New Zealand entering a currency union with Australia or adopting the US dollar as a currency has, to date, largely focused on the implications of such moves for integration of New Zealand into the world economy. The implications for the objectives and conduct of monetary policy have been largely ignored.

The major question that has arisen with regard to the conduct of monetary policy within the current institutional framework in New Zealand is whether the Reserve Bank has been too vigorous in its pursuit of the inflation objective. In particular, it has been argued that the Reserve Bank can take vigorous action to influence the inflation rate over a short time horizon by dramatically moving the exchange rate. A strict inflation target may, as a result, encourage monetary activism aimed at keeping inflation within narrowly specified bands. The short run real effects of such activism could be large. A loose inflation target may mean, however, that the longer-term goal is continually subordinated to short-run considerations. If the inflation target does not have to be achieved to within a specified margin of error by a specific date, it may never be achieved.

The major alternative to specifying a target, and possibly a set of constraints, on Reserve Bank policy is to implement a passive monetary framework. Such a framework focuses on avoiding the excesses, rather than exploiting the benefits, that can arise from the exercise of centralised monopoly power. It forgoes the attempt to attain particular goals in exchange for establishing general conditions thought to be conducive to producing desirable outcomes and avoiding undesirable ones.

One could draw an analogy between a passive monetary regime and the decentralised market system. The specific outcomes of a market system are unpredictable because they depend on many widely dispersed facts about the costs and benefits of using resources in different ways. The essence of the invisible hand argument is that, because one can presume that people make themselves better off by engaging in voluntary trades, it is preferable to allow more, rather than fewer, trades. Markets allow people to pursue ends that they alone know. Alternative systems for allocating resources seek to override individual choices by placing monopoly power in the hands of a few decision makers. The justification is that decisions could then be explicitly aimed at achieving the best results imaginable, given the limited resources available to society as a whole. While decision makers who are given the right to coerce others may believe that they are raising the average level of welfare, they often have incomplete and inaccurate information and can easily be mistaken. Forcing people to do things against their will also imposes direct losses in welfare that need to be offset against any gains in welfare that centralised decision makers can achieve. Coercion can also be used for purposes other than attaining the best imaginable result. While monopoly power might, in theory, be able to achieve outcomes that are superior to markets by avoiding externalities, solving public goods problems or eliminating other 'market failures', in practice the power to do good can also be abused, or used unwisely, and can result in far worse outcomes than a market could ever achieve.

We argue in Chapter 2 that exogenously specifying the growth rate (or level) of the monetary base is the passive monetary arrangement that is closest to the current institutional framework for supplying money in New Zealand. We point out a number of similarities between such a rule and a gold standard or other commodity-based money supply system. The commodity-based system is likely to be more expensive to operate,

however, and may be less flexible in a time of crisis. We argue that a monetary base rule (or commodity-based regime) is likely to be more successful in controlling inflation than a fiat money regime operated without an exogenous rule. A strict monetary base growth rule suffers from a number of potentially serious limitations, however, and no country has operated a pure monetary base rule. Even the gold standard regime was not operated strictly according to the rules.

Chapter 3 examines the competitive supply of base money as a more explicit analog of the market economy. We argue that such a system is likely, in practice, to result in a commodity-based money supply regime. As such, it does not appear to offer many advantages relative to a money base targeting regime and it suffers from a number of disadvantages.

The proposal that New Zealand adopt the US dollar as a local medium of exchange could also be regarded as a way of making monetary policy immune to domestic New Zealand political considerations. Effectively, New Zealand would abandon its own monetary policy in favour of the policy being implemented by the US Federal Reserve. Therein lies one of the weaknesses of the proposal. While most commentators agree that US monetary policy has been good in the last decade, this has not always been the case. The US dollar lost ground as an international currency against the German mark and the Swiss franc from the late 1960s to the mid-1980s mainly because those countries were seen as running a better monetary policy than the US Federal Reserve.³

The good recent performance of the US Federal Reserve is almost universally credited to Alan Greenspan and not to the quality of the institutional arrangement. There are no institutional constraints preventing the appointment of a new Federal Reserve governor who has a very different notion of how monetary policy ought to be run.⁴ In particular, unlike New Zealand and, now, many other countries, the US Federal Reserve is not constrained by law to operate an explicit inflation targeting policy.

Even if the US Federal Reserve continued to operate a low inflation policy, there is no guarantee that New Zealand would have low inflation. For example, Hong Kong has had higher inflation than the United States since it introduced a currency board based on the US dollar, while Ireland has in recent years had higher inflation than continental European economies using the same monetary standard.

For New Zealand, a monetary union with Australia may, in practice, produce a less fundamental overhaul of existing arrangements than would the adoption of the US dollar as a local currency. The central banks of Australia and New Zealand now operate within an inflationary targeting framework, so their policy approaches are more similar

³ The US dollar also lost ground against the Japanese yen in this period, but that may have been caused, to a greater extent, by the rapid growth of the Japanese economy than by a perception that Japan's central bank was more effective at controlling inflation. Japan actually had worse inflation, and worse monetary policy, than the United States in the early 1970s.

⁴ The re-appointment of Alan Greenspan by the Clinton administration showed, however, that there are implicit political constraints on changing Federal Reserve policy. On the other hand, this particular event might have reflected continuing voter sensitivity to the inflation of the 1970s and early 1980s, which could decline as that experience fades further into the past.

than was the case in the early 1990s. Nevertheless, New Zealand may prefer a new joint central bank to operate a more passive policy than either country's Reserve Banks now pursue. A reasonable fear would be that any discretionary authority given to a joint central bank would be used to further Australian interests at the expense of New Zealand.

Determining the best monetary policy that New Zealand could achieve either on its own or in combination with Australia is also relevant to the question of whether New Zealand should adopt the US dollar as its currency. The best result that might be achieved through an independent monetary policy represents the 'opportunity cost' of a currency board. Thus, whatever currency arrangements are chosen in the long run, it is important to ask whether the current institutional arrangements are delivering, in the words of treasurer Michael Cullen, "the best outcomes possible".

1.3 What, if anything, should be done?

We argue that a low and stable inflation rate is the only reasonable ultimate goal for a central bank. We suggest, however, that the strict inflation targeting practised in New Zealand may have encouraged excessive monetary activism. Firm short-term inflation targets encourage the Reserve Bank to manipulate the exchange rate in order to bring inflation back within the target range. Such a policy imposes large costs on the traded goods and interest-sensitive sectors of the economy.

We suggest two ways of moving toward a more passive monetary policy regime. The inflation rate forecast from structural models of the economy could be targeted in place of the actual rate achieved over a short period. This would keep policy appropriately focused on the future rather than worrying about the past, which cannot be influenced by current policy. A difficulty with targeting the projected or expected inflation rate, however, is that this can only be done with the aid of a model of how the economy operates. Unfortunately, the inflation predictions arising from existing models of the economy are not sufficiently accurate to ensure that low predicted inflation will result in low inflation outcomes.

Supplementing the inflation target with a limitation on the average growth rate for the monetary base and its variability may provide a satisfactory compromise between avoiding activism and ensuring that the inflation rate cannot get unacceptably large. The Reserve Bank considered, and dismissed, monetary base targeting in 1989. We find the arguments that were used to dismiss a base money growth rule at that time to be unconvincing. We nevertheless agree that a strict monetary base targeting rule is unlikely to be preferable to New Zealand's current monetary regime. At the least, such a rule would need to be supplemented by allowances for accommodating large increases in the demand for base money that might otherwise lead to bank runs or other severe disruptions of the financial sector.

We suggest that a combined inflation and base money targeting rule could produce better outcomes than either rule alone. Essentially, the idea would be that missing the inflation target could be excused so long as base money growth was very low, while

missing the base money growth target could be excused if the inflation rate was very low. In the former case, the low base money growth rate would suggest that the high inflation was not the fault of the Reserve Bank. In the latter case, the low inflation rate would suggest that the high base money growth rate was meeting an increased demand for base money rather than producing inflation.

If monetary union with Australia were to occur in the near future, a joint central bank would be likely to adopt an inflation targeting framework. New Zealand might be advised to argue that a joint central bank ought to follow an even more passive policy regime than is currently pursued by either the Australian or New Zealand Reserve Banks. An advantage of monetary union with Australia is that it may make the current advances in monetary frameworks on both sides of the Tasman more secure against future political changes.

A monetary union with Australia would be less desirable if New Zealand re-regulates its labour markets. Monetary union might require the New Zealand economy to respond more flexibly to external shocks. Granting privileges to trade unions, legislating wages or features of employment contracts, providing unemployment benefits that discourage efficient job searches, or imposing barriers to hiring and firing, all increase frictions in labour markets and raise the costs of adjusting to economic shocks. Open migration between Australia and New Zealand would also need to be further encouraged, aided by mutual recognition of more professional and technical qualifications. Finally, each country would need to ensure that it has stable and moderate fiscal policies in the period prior to a monetary union.

Establishing a currency board based on the US dollar may yield other benefits for New Zealand. In particular, interest rates would most likely fall, perhaps by as much as 1 percent annually for the riskless real rate. The largest potential cost of adopting the US dollar would be that New Zealand would have to accept the monetary policy of the US Federal Reserve Board. While the current monetary arrangements in New Zealand may not be beyond criticism, they are better than the institutional framework under which the US Federal Reserve currently operates.

While there is considerable prior experience with currency boards (including in New Zealand and Australia in colonial times), these have usually been in situations in which currencies are based on a gold or silver standard. It would be worth watching the experience of Argentina before choosing such an arrangement for New Zealand.

We conclude that the practical strategy for New Zealand to follow in the short term is to improve its fiscal and labour market policies, which ought to be done in any case. It should also re-examine the desirability of base money growth targeting as a supplement to the current inflation targeting regime. In particular, restrictions on the growth rate of base money, except in times of sufficiently low inflation, may encourage a more passive monetary policy without inflicting the worst features of a strictly exogenous base money supply. In the meantime, New Zealand should monitor international developments in the formation of monetary unions or currency boards while exploring the attitudes of potential partner countries.

CONDUCT OF POLICY UNDER CURRENT ARRANGEMENTS

The issue of the appropriate target for monetary policy was debated in New Zealand when the Reserve Bank of New Zealand Act 1989 was considered by parliament. Sherwin (1999) quotes the final report of the Finance and Expenditure Committee of parliament:

The Committee ... is firmly of the view that the primary function of monetary policy should be that set out in clause 8(i) ... Monetary policy at the end of the day can only hope to achieve one objective, that is, price stability.

Sherwin notes that the Reserve Bank of New Zealand Act 1989 "was passed without a single dissentient vote in parliament". Similarly, in a press release dated 9 May, 2000, the current treasurer stated that he supported the intentions of the Reserve Bank of New Zealand Act 1989:

The government is strongly committed to maintaining the operational independence of the Bank and to section eight of the act defining the maintenance of price stability as "the primary function of the Bank".

He also said, however, that:

It is appropriate to examine the Reserve Bank's operations and governance to ensure it has the tools it needs to do its job as effectively as possible with least volatility to interest rates and the exchange rate.

Accordingly, the first item to be considered by the monetary policy review is whether the Reserve Bank's approach to achieving its medium-term price stability target avoids "undesirable instability in output, interest rates and the exchange rate". These words might be interpreted as a retreat from the position stated in the report of the Finance and Expenditure Committee quoted above that "monetary policy ... can only hope to achieve one objective". Any attempt to minimise volatility in other variables would appear to come at the cost of achieving the inflation target.

Svensson (1997) provides an interpretation of inflation targeting that may avoid such a conflict. The essential idea is that inflation targeting involves a commitment to achieving a future goal for inflation. The time horizon until that goal is achieved may provide an additional degree of freedom for monetary policy:

Suppose a shock has made inflation rise to a level above the target (the midpoint of the target range). What should the bank do? Well, if keeping inflation as close to the target as possible is the only thing that concerns the bank, it should obviously do everything it can do [to] get inflation back to target as soon as possible. This by all accounts requires very vigorous and activist policy, with dramatic interest rate and exchange rate changes ...

This may succeed in stabilising CPI inflation around the inflation target. However, it most likely leads to considerable variability of exchange rates and interest rates, as well as of output, employment and probably the domestic component of inflation as well ...

In practice, no inflation-targeting central bank behaves this way. Instead they simply avoid causing this instability to other variables than the CPI, by adopting a more gradualist approach. They do not attempt to take inflation back to target as fast as possible. Instead, they take it back gradually, and aim for the inflation target further into the future ...

Thus, some concern about the stability of output, employment or the real exchange rate is a reason for hitting the inflation target at a longer horizon. It is important to note, however, with regard to these real variables, that any concern here is about their *variability* and not their average *levels*. It is not in the power of monetary policy to affect the long-run average level of real variables.

We said that the time horizon may provide an additional degree of freedom for monetary policy because there is likely to be an interaction between the time horizon and the likelihood that the inflation target will be achieved. In particular, in order to achieve the inflation goal, there is a constraint on the accumulated monetary policy actions that can be taken between now and the time when the goal is to be achieved. As Svensson remarks:

It is obvious that there is a limit to how much flexibility is appropriate. If central banks go too far down the road of flexibility, that is, if the horizon they are aiming for is too long, or the rate at which they bring inflation back to target is too slow, reasonable doubts about the commitment to the inflation target may arise. Then the credibility of the inflation target may suffer, and inflation expectations may fail to be stabilized around the inflation target.

As we argue in more detail in Chapter 5, a loss of credibility for the central bank is likely, in turn, to make it harder to achieve the inflation goal, or to do so at the least cost in terms of real variability.

In the remainder of this chapter, we first re-examine the arguments for making low inflation the primary function of monetary policy. In doing so, we also outline how monetary policy affects the average level of prices and, thus, how monetary policy can achieve the desired inflation goal. This requires that we distinguish base money, which is supplied by the central bank, from other types of monetary assets, which are supplied by private financial intermediaries. We then return to the issue of how much flexibility in monetary policy is appropriate. We consider base money targeting as an exogenous constraint on monetary activism and discuss some of the defects of a strict monetary base targeting regime. The chapter ends with a discussion of the current inflation targeting regime and how it might be modified.

2.1 Inflation as a policy concern

The main function of money is to allow people to overcome the problem of the 'double coincidence of wants' under barter. In a barter system, anyone who wants to exchange an item for something else needs to find a trading partner who wishes to make the offsetting trade. When there is a universally acceptable medium of exchange, however,

individuals can swap what they have to sell for the transactions asset (such as coins) and then use that asset to buy what they want. The costs of searching for a trading partner can thus be greatly reduced. The ability to trade for money also reduces the risk of specialisation in production. By specialising, people develop skills in producing particular items, thereby increasing the productivity of resources.

Money also provides advantages as a store of value. Because money is universally acceptable, it provides a type of insurance against future unforeseen events.⁵ The universal acceptability of money is an advantage over other types of financial contracts that may need to be enforced. In addition, while some economic shocks may greatly reduce the future value of assets such as equities, one can be sure that money will always be useful for obtaining the wide range of goods and services that one may need.

The substantial benefits provided by money explain why people continue to use it even when the costs of doing so get very high. In countries where the inflation rate has been extremely high (thousands, millions, billions and more percent per annum), people continue to accept money as a medium of exchange. Imposing such high costs on the use of money, however, also imposes high costs on the economy. People begin to barter. The risks of specialising in production increase. Inflation is a tax on the use of base money. As with any tax, the efficiency losses mount roughly in proportion⁶ to the square of the tax rate, which in this case is approximated by the nominal rate of interest.⁷

Because the variability of the inflation rate usually increases along with the average level of inflation, all types of financial contracts become much more risky. People become reluctant to make loan commitments, thus making it difficult for firms to finance investments or make future plans. Another major problem is that our accounting and tax systems are predicated on the value of money remaining stable.

⁵ In Hartley (1988), for example, we show that the liquidity services provided by money are enhanced by uncertainty about future possible states of the world, coupled with an absence of assets the value of which varies with each possible future state. As Coleman (1999) explains:

It is quite obvious that financial markets are incomplete – that there do not exist financial assets that agents can use to contract for the delivery of different types of goods in all possible different states of the world in all future time periods ... Market incompleteness means that people cannot perfectly insure themselves against future random events, but they can enter some financial contracts, and accumulate different types of monetary assets, to provide themselves with limited insurance ... One of the prime contracts that agents use to allocate income into the future are simple monetary contracts that deliver one nominal unit at a specified time.

⁶ In the usual partial equilibrium analysis of the efficiency cost of a tax, the constant of proportionality depends on the elasticities of supply and demand. Thus, in the limiting case of a perfectly inelastically supplied good, for example, the constant of proportionality is zero and the tax imposes no efficiency costs until it becomes so high that all producer rents disappear and supply falls to zero. The efficiency cost is only 'roughly' proportional to the square of the tax rate mainly because a partial equilibrium analysis is incomplete. A general equilibrium model that allows for interactions between markets, including the effects of other taxes, is required to measure accurately the efficiency costs of a tax. The usual partial equilibrium formula for the efficiency costs of a tax is also an approximation because it implicitly assumes that the supply and demand curves have constant elasticities.

⁷ Because base money costs little to produce, the efficient demand level would occur where the marginal benefit of real money balances is negligible. The actual demand level will occur where the marginal benefit of real money balances equals the opportunity cost, that is, the nominal return, on a riskless bond.

2.1.1 *Inside and outside money*

The value of money, or the inverse of the average level of prices for marketed goods or services, is determined by the demand for and supply of the monetary instrument supplied by the central bank. The liabilities of the central bank that are held by the private sector are also known as the 'monetary base', or the stock of 'outside money'. While this forms the base of the money supply system, 'inside money' in the form of bank account balances held by households or firms is also part of the complete set of assets that is used to finance transactions.

One can regard private bank account balances as indirect claims on the monetary base. A bank that accepts deposits of base money effectively issues a liability to the depositor. This liability commits the bank to providing base money on demand to the depositor at any time (so the balances are also known as 'demand deposits'). Issuers of inside money sustain their commitment to providing base money in exchange for their liabilities by holding reserves of base money either as vault cash or as deposits with the central bank.

As long as the public is confident that the bank can make good on its promise to deliver base money on demand, people will treat the bank liabilities as a very close substitute for base money. Claims to such deposits will be almost as 'liquid' as base money itself. Demand deposits will be almost as universally acceptable as base money for making transactions and, like base money, can be used almost at any time to finance a transaction.⁸

Other financial instruments are, in turn, claims to demand deposits and thus indirectly claims to the money base. For example, a credit card is acceptable as a transactions device because the merchant believes demand deposits will be exchanged for the outstanding credit card debits at the end of the day. In turn, customers can obtain a credit card because the issuer believes the customer will use demand deposits to pay the outstanding balance at the end of the month (or borrow funds in order to do so).⁹

While the interest yield on notes and coin is usually zero, inside money typically pays a positive rate of interest.¹⁰ The interest yield on different components of the inside money

⁸ For some transactions, such as paying bills by mail, demand deposits are superior to base money. Cash may be preferable, however, when making small purchases in a hurry, or when a record of embarrassing or illegal transactions is undesirable. More generally, the interest yield on inside money tends to reduce its liquidity. Cash balances generally are chosen (by exchanging less liquid assets) before one knows what the cash will be used for, or how much cash one may need. Once one is holding cash because it is required for some transactions, it is optimal to use cash in preference to inside money when it is possible to use either. Interest receipts within a period can be maximised by using cash before spending the more valuable inside money balances. These issues are discussed more formally in Hartley (1988).

⁹ Brito and Hartley (1995) formally model the demand for credit cards as both a transactions vehicle and a source of consumer loans.

¹⁰ Interest is often paid on bank reserves held as accounts at the central bank. Interest has even been paid on the currency portion of outside money. Between 1837 and 1839, the Republic of Texas issued bank notes payable with 10 percent interest one year from the date of issue. As noted above, paying interest on notes tends to reduce the efficacy of the notes for financing transactions because people would be reluctant to part with them as the payment date drew near.

supply compensates for differences in their liquidity. Less liquid monetary assets will need to yield higher explicit interest returns if people are to hold them willingly.

Because currency is the most liquid asset, people will choose to hold it, albeit in small amounts and for short periods of time, even though it pays no interest at all. All types of inside money are less liquid than cash and thus need to pay a positive interest rate. Inside money assets, nevertheless, yield a nominal return that is less than the yield on a riskless bond because inside money supplies more liquidity services than does a government bond.¹¹ The interest differential between bonds and inside money will reflect the value of the additional liquidity services provided by the inside money asset.

2.1.2 The price level in an economy with inside money

One can conceptualise 'the price level', or the average level of nominal prices, as equilibrating the demand for, and supply of, outside money.¹² The inverse of the price level is, by definition, the value of outside money in terms of goods and services, or the basket of goods and services that could be obtained from giving up one unit of outside money. Fluctuations in the liquidity services provided by different types of inside money will be reflected in the explicit interest yield on those monetary assets. Changes in the demand for inside money can affect the price level, however, if they simultaneously alter the demand for outside money. Thus, for example, a change that raises the demand for inside money at the expense of outside money will raise the price level if the supply of outside money is not reduced to match the lower demand for it. On the other hand, a change in transactions technology or government regulations that alters the demand for one type of inside money relative to another but does not affect the demand for outside money would also leave the price level unchanged.

An expansion in the monetary base that is not offset by an equivalent increase in the demand for the base will reduce the value of base money in terms of goods and services, or, in other words, increase the price level. The claim that a change in the money supply will lead to a proportional change in all nominal prices while leaving all real variables unchanged is usually called the 'quantity theory of money'.¹³

Although the Reserve Bank has complete control over the supply of base money, it has only incomplete control over the average price level because it cannot control the demand for base money. The central bank could, in principle, achieve a desired inflation target by choosing a base money growth rate equal to the change in demand for the

¹¹ Government bonds may also provide liquidity services. For example, commercial banks and stock brokers often buy government bonds as a temporary store of value while they are transferring investments between longer-term risky assets.

¹² Chapter 5 contains a more detailed discussion of the determination of prices, interest rates and exchange rates in an economy with banks and other financial intermediaries.

¹³ As the quotes in Chapter 5 show, this distorts the quantity theory as first expounded by Hume. He claimed that money supply changes initially affect production and employment and alter prices with a lag. This claim was based on evidence and was inconsistent with classical economic theory. Keynes emphasised the inconsistency between formal classical theory and the evidence on short-run effects.

monetary base plus the target rate of inflation.¹⁴ Time lags between monetary policy actions and their effects on prices, however, complicate this task. In particular, interest rates are affected by changes in base money supply, while changes in interest rates also alter the demand for different monetary assets and, thus, the demand for the base. As we explain in Chapter 5, other factors also influence the time lag from changes in the base money supply and changes in average prices.

Rates of inflation above a few percent each year almost always result from an increase in base money supply. While the demand for base money can fluctuate a few percent each year, changes in the value of outside money of a greater magnitude typically require an expansion of the supply of base money.

Improvements in transactions technologies are one source of exogenous changes in demand for the money base. For example, automatic teller machines reduced the costs of converting demand deposits into cash and probably reduced the average stock of cash that most people hold. When it costs less (in lost time) to obtain cash from the bank, it is optimal to withdraw less on each trip and make more trips. As a result, the average cash balances held by households and firms will fall relative to the volume of transactions financed over a given time interval.¹⁵ Credit cards also allow households to reduce their demand for both cash and inside money. Purchases are aggregated into a single payment that can be made by cheque at the end of the month instead of many payments made throughout the month. Higher yielding assets can be held until the credit card payment falls due, at which time the assets are liquidated to provide the necessary demand deposits. In effect, a higher level of transactions can be financed with the same monetary base. The demand for the money base falls and, if there is not an offsetting fall in base money supply, the price level will rise.

By contrast, economic growth raises the number of transactions and thus the demand for all types of monetary assets including base money. Absent changes in transactions technology, economic growth will, therefore, tend to reduce nominal prices unless there is an offsetting expansion in base money.

Exogenous changes can also alter the transactions value of one type of inside money asset relative to another, while leaving the demand for the base and the price level unchanged (assuming the supply of base money is held constant). The interest yield on the inside money asset that has become more useful for making transactions will fall in equilibrium, while the yield on the asset that has become relatively less useful will have to rise as the demand for that asset falls.

¹⁴ Strictly speaking, this is only possible if the target inflation rate is not too negative. Nominal interest rates will fall if there is an anticipated deflation. The lowest nominal interest rate that can be paid on a government bond is zero, however, because people can, instead, hold outside money that has the same risk and a zero nominal interest yield.

¹⁵ A referee suggested that there may have been an offsetting increase in the demand for cash to put inside the machines. Most of this cash would have been a substitute, however, for the cash balances held by tellers inside the branch.

2.1.3 *Why inflation is costly*

Prices are quoted in terms of the monetary instrument supplied by the central bank. Revenues and costs, therefore, are naturally measured in the same units. The monetary instrument supplied by the central bank thus also serves as a unit of account. It is conceivable that the unit of account could differ from the transactions medium. For example, before the advent of decimal currency, it was common to quote prices in guineas.¹⁶ Even in this case, however, accounts were kept in pounds sterling, not in guineas.

Keeping accounts in a unit that continually fluctuates in value vis-a-vis the transactions asset adds substantially to accounting costs. This is illustrated by the difficulty the accounting profession had in encouraging the use of constant cost accounting principles in the 1970s and 1980s when inflation rates rose above 10 percent per annum. A particular cost imposed when accounts are kept in historical cost, rather than constant cost, is that the real value of capital depreciation allowances falls over time. The real tax burden on capital income rises substantially, placing an additional burden on investment and economic growth. Firms are also taxed on paper capital gains on inventories when accounts are kept in nominal terms.

Changes in the value of the monetary measuring standard also lead to numerous calculation errors. Changes in the standard are confused with changes in the true value of the good or service, leading to real responses to what is essentially noise.¹⁷ These costs result largely from unanticipated inflation. The monetary measuring standard could be adjusted for inflation that is anticipated. Some of the costs associated with such adjustments, for example, the costs of indexing accounts or negotiating indexation clauses in wage agreements, may, however, be non-trivial.

Inflation may also have significant non-economic costs. In particular, an important function of government is to provide and enforce measuring standards, which essentially are public goods. It would be very costly for all individuals to check continually the veracity of claims about the weights or volumes of different products, or the accuracy of petrol pumps and the like. Furthermore, any checking that one individual does will simultaneously provide benefits to other customers buying from the same firm. Individuals will have an incentive to free ride on the checking activities of others, and efficiency may be enhanced by a joint enforcement mechanism. If people expect government to maintain the value of the monetary standard, and it fails to do so, trust in

¹⁶ A guinea was defined as £1/1/0. When the guinea was first issued as an English gold coin in 1666, its gold content was worth £1 in sterling silver coin. People hoarded the gold coins as the gold price rose relative to the silver price and the lower denomination silver coins deteriorated through more frequent use and as a result of clipping. By 1695, the guinea had risen in value to almost 30 shillings. The silver coinage was then re-coined, and the sterling value of the guinea stabilised. From 1760 until 1817, the sterling value of the guinea again rose as the silver coinage deteriorated. The re-coinage in 1817 replaced the guinea with a lighter weight sovereign. The guinea thus came to represent 'value' and merchants wishing to signal that they offered 'value for money' quoted their prices in guineas.

¹⁷ An analogy can be made with measuring standards for lengths or weights. If the instruments used to measure weight fluctuated at random, people would think the weights of items were changing when they were not. The resulting measurement errors could be very costly.

government will be eroded. People will feel that government is failing in one of its most basic duties.

2.1.4 Why target inflation with monetary policy?

As noted above, the government, or more particularly the central bank, does not have complete control over the average price level. Nominal prices will fluctuate in response to changes in the demand for the money base as well as the supply of it. Nevertheless, fluctuations in the demand for the money base are unlikely to produce even moderate rates of inflation. Demand for the money base will tend to evolve gradually over time. Improvements in transactions technologies tend to reduce demand for the money base, while economic growth, and growth in the volume of transactions, will tend to have the opposite effect. Rates of inflation of more than 2 percent a year almost always result from expansion in the base money supply, and often are only cured by reforms that ensure base money cannot expand beyond the level the public demands. In turn, an expansion in the base money supply, or the total liabilities of the central bank, must be matched by an expansion in the assets of the central bank. This is why Sherwin (1999) remarks:

We could also argue, reasonably, that the major changes in New Zealand's monetary policy came with decisions to float the exchange rate and commit to market funding of the government's fiscal deficits.

If there is a clean floating exchange rate (where the central bank is not required to intervene in the foreign exchange markets) and the central bank cannot be forced to buy government debt, the central bank cannot be forced to increase its assets.¹⁸ If the increase in assets of the bank is limited, so is the increase in its liabilities, that is, the money base.

If controlling inflation is a goal, monetary policy is the optimal instrument for achieving that goal. In particular, if base money is undergoing a sustained and rapid expansion, no other policy can counteract the resulting tendency for inflation to increase. Using monetary policy for other economic objectives ultimately compromises those objectives and the inflation target.

Even if policy instruments can be used for a number of purposes, they ought to be used for the purpose for which they are relatively most suited. If a government tries to use each policy instrument to achieve multiple goals, policies will be difficult to coordinate and no policy targets are likely to be met.

While low and stable inflation is the 'outcome' from central bank actions that people care about, the current inflation rate may not be suitable as a specific measurable 'output' for which the central bank, or its chief executive, should be held accountable.¹⁹ Although the central bank has complete control over the money base, it does not have complete control over the inflation rate because the latter also depends on the demand for the base. The

¹⁸ The bank could expand the money base by buying bonds in open market operations.

¹⁹ Reddell (1999) defines "outputs" from a government agency as "the measurable products or services that each agency was mandated or contracted to deliver". The "outcome" is the target that people, or policy makers, ultimately care about.

Policy Targets Agreement for the Reserve Bank of New Zealand explicitly acknowledges this fact by altering the inflation target in response to specific types of market shocks that are likely to affect the demand for base money and are outside the Reserve Bank's control.

2.2 Short-run real effects, and long lags

We have argued that monetary policy is most appropriately directed at achieving the inflation goal. As we argue in more detail in Chapter 5, however, a monetary expansion is likely to raise investment, output and employment in the short run²⁰ by stimulating bank lending, devaluing the real exchange rate²¹ and reducing real interest rates. While the short-run effects of a monetary expansion may be beneficial on net, the expansion will ultimately produce inflation. Monetary expansion cannot permanently raise the level of economic activity.

Conversely, the short-run real effects of tighter monetary policy aimed at reducing future inflation tend to be undesirable. As we explain in Chapter 5, reducing the growth rate of base money tends to reduce bank lending, raise real interest rates and cause the real exchange rate to appreciate. The traded goods and interest-sensitive sectors of the economy will be adversely affected. If controlling inflation is always subordinated to avoiding short-run real costs, however, then the inflation target will never be attained. The one policy tool that could be used for that task will, by default, be allocated to another purpose. The public will lose confidence in the commitment of government to reducing inflation. This is, in turn, likely to raise further the real costs of achieving the inflation goal. It is all too easy for monetary policy to drift back into the role of supporting unacceptably high rates of inflation.

The ability of monetary policy to have short-run real effects can lead to a problem known as 'time inconsistency'. The central bank may have an incentive to promise one set of actions but do something else entirely when the time to act arrives. In particular, because inflation is costly if it is allowed to continue and is costly to eliminate, the central bank would like to commit to maintaining low rates of inflation. The costs of inflation are, however, likely to rise as the initial rate of inflation increases. At low rates of inflation,

²⁰ It is instructive to plot growth rates in real and nominal variables against growth rates in measures of 'the money supply'. (Different money supply measures incorporate different components of inside money supplied by the private banking system.) When annual inflation and money growth rates are used, the points form a cloud and one does not find a systematic relationship. If the growth rates are averaged over longer periods, such as two, five or 10 years, the points tend to fall much more on to a straight line with a slope of unity as the averaging period lengthens. Conversely, if one plots a real variable against money supply growth there tends to be a weak relationship at short time horizons, but the relationship evaporates as the averaging period is lengthened. The classic illustration of this result is Lucas (1980). Coleman illustrates a similar point with a graph of the inflation differential between two countries against the change in the exchange rate. Again, averaging over five years or more reveals a straight line relationship with a slope of unity.

²¹ The real exchange rate is the ratio of the domestic price of tradeable goods to the price of non-traded goods. Because monetary policy causes the exchange rate to overshoot its long-run value, and domestic prices respond with a lag, the price of tradeable goods tends to fall relative to the price of non-traded goods following a monetary tightening.

the central bank (or more particularly its political masters) will be tempted to renege on a commitment to maintain low inflation by engineering a monetary expansion. The short-run benefits of a monetary stimulus will outweigh the short-run costs. To eliminate the temptation of those short-run benefits, the bank may need to run a moderate inflation rate so the costs of increasing that rate balance out the short-run benefits. A relatively constant moderate rate of inflation would, nevertheless, impose excess costs relative to a situation in which the bank is able to commit to a zero inflation rate. A rule that constrains the central bank from increasing the inflation rate may achieve a better long-run outcome than a regime that allows the bank to choose, or to be pressured into choosing, any monetary policy at any time.

The short-run real effects of monetary policy contribute to a second problem. Changes in interest rates, the exchange rate and output all alter the demand for money. For this reason, and for other reasons that we discuss in more detail in Chapter 5, monetary policy affects nominal prices with a time lag, with the maximum effect on inflation occurring after a substantial delay. Therefore, as the date for achieving an inflation target approaches, current monetary policies will have smaller effects on the inflation target. If actions taken early on in the planning interval are grossly at variance with achieving the long-run inflation target, it becomes more difficult to correct matters as the target date approaches. Later corrective actions will need to be much more vigorous. Lesser variability in output, employment and other macroeconomic aggregates early on in the planning horizon may be obtained only at the expense of much greater variability in these same quantities as the inflation target date approaches.

More generally, time lags between monetary policy actions and inflation produce a tendency toward over-control. One can draw an analogy with steering a supertanker, or landing the space shuttle. The vehicle responds slowly to a change in controls, but continues to respond for a long time. If one becomes impatient with the slow response of the vehicle, there is a tendency to push the controls a long way in the desired direction. Once the vehicle starts to respond, it is likely to move too far in the desired direction. If the controls are slammed into reverse in a desperate attempt to bring the vehicle back on to the desired course, the vehicle eventually will again overshoot the desired alteration in course. A continuing series of extreme movements in the controls is likely to destabilise the system.

As we explain in Chapter 5, there will be a tendency for the exchange rate to appreciate following a monetary tightening. This will allow monetary policy to have a relatively prompt effect on the prices of traded goods, giving the Reserve Bank one link between monetary policy and inflation that involves relatively short time lags. Relying upon this link, however, will impose substantial real costs on the traded goods sector of the economy. It may also make the economy more vulnerable to future shocks by encouraging borrowing in foreign capital markets.

2.2.1 *Activist monetary policy*

It is difficult to conduct monetary policy so as to ensure the long-run inflation goal is attained when the central bank also attempts to limit excessive short-term adjustment costs caused by monetary policy. On the one hand, paying too much attention to the short-term real effects of monetary policy may result in a drift toward higher inflation rates. On the other hand, requiring monetary policy to achieve a tightly specified inflation target at all times might result in an excessively active monetary policy that imposes substantial unnecessary short-term adjustment costs on the economy.

Keynesian economists promulgated the more dangerous proposition, however, that the short-run real effects of monetary policy should be actively exploited to raise output growth and employment. Under the influence of Keynesian economists, the objectives of central banks were rewritten to include output growth and employment targets. A widespread belief that the Great Depression arose from within the market economy and would not have been eliminated without government intervention also contributed to this development. It is now widely accepted by monetary economists, however, that the severity and length of the Great Depression were caused by incompetent monetary policy. There is no inherent tendency for a market economy to experience severe depressions, although more minor fluctuations in aggregate output and employment appear to be part of the normal response to various types of shocks such as productivity or resource supply shocks.

As we explain in Chapter 5, the crudest version of Keynesian economics is based on an assumption that money supply changes have real effects because people in general, and workers in particular, are irrational. They choose to ignore information about anticipated or known money supply changes when arranging trades of goods or services, or they irrationally choose not to index nominal contracts as inflation is realised and measured. The theory essentially makes the case for activist monetary policy by assumption.

The crudest version of the Keynesian explanation of the real effects of money supply changes is now a minority view within the economics profession. Most economists now agree that a central bank cannot systematically exploit individual irrationality to achieve predictable real effects. Any attempt to do so will cause individuals to adjust their behaviour, with the result that the real effects disappear or become less predictable.

Many economists would go further and assert that monetary policy can have no real effects. They argue that what appears to be a real effect of money supply changes in fact reflects a reverse causal influence on monetary policy actions of real changes in the economy resulting from other forces.

We discuss an alternative model in Chapter 5 that allows monetary policy to have predictable real effects without assuming that individuals are irrational or uninformed. Thus, real effects cannot be eliminated by providing individuals with better information

or allowing them time to learn about policy rules. Essentially, we argue that monetary policy actions can disrupt the operation of the banking system. While these effects are systematic and predictable, exploiting them is unlikely to be desirable. Under this theory, monetary policy actions distort capital and traded goods markets in the first instance, and subsequently other markets, as the monetary impulse works its way through the system. It is most unlikely that matters could be improved by adding such distortions to an economy already trying to cope with other major shocks.

For example, suppose an economic change requires resources to be reallocated away from some slower growing sectors of the economy toward others that are experiencing more rapid growth. There are real costs of achieving such a transfer of resources. People need to discover that their services are no longer as valuable in their current lines of employment. This may take some time, because it will be difficult to separate temporary declines in demand from permanent ones. As we discuss in more detail in Chapter 5, employment contracts, which can be viewed as an implicit form of insurance of workers by firms (or more accurately their shareholders), may also slow the adjustment process. Once people decide to move to a new line of employment, they need to search for a suitable job and may need to relocate. The adjustment process may thus be associated with a decline in total output and employment, as output falls in the sector that is in relative decline before it expands in the other sectors. Measured unemployment, that is people searching for a new job, will also rise.

Now suppose the government pressures the central bank to engineer a monetary expansion. The result may be an expansion in firms in a position to borrow from the banks, or some firms in the traded goods sector, but the process has added another artificial temporary shock to the economy. The monetary shock will cause a greater churning of productive resources from some sectors of the economy to others, but now for reasons that are artificial and unsustainable in the long run. It seems unlikely that such an intervention will raise efficiency relative to just leaving the original adjustment process to run its course. It also would be very difficult to design monetary policy interventions to offset exactly the effects of other shocks impinging on the economy. There is too much uncertainty about the current shocks that are affecting the economy, and too little information about the consequences of monetary intervention.

Microeconomic policies are more appropriate instruments for influencing the costs of adjusting to shocks. Such policies have the added advantage of increasing long-run growth and prosperity. In particular, the government can affect many of the real costs of reallocating labour from one firm or industry to another. As we explain in more detail in Chapter 5, these costs are all raised by:

- exogenously imposed award or minimum wages that destroy employment opportunities, and discourage the efficient allocation of workers to different jobs or locations;
- unemployment benefit programmes that encourage too much, or too little, job search or discourage workers from migrating to other regions;
- impediments to hiring and firing workers;

- unnecessary job qualifications or other barriers to entry into particular jobs or professions; and
- barriers to adjusting employment agreements to suit new circumstances.

Unfortunately, the current New Zealand government appears to be moving in the wrong direction with regard to most of these types of policies.

All that monetary policy ought to do with respect to real outcomes is to avoid making a mess. The argument for assigning monetary policy to the inflation target thus is strengthened. The incidental real effects of monetary policy actions nevertheless imply that, once unacceptably high inflation rates have occurred, monetary actions taken to reduce inflation ought to be gradual. In order to avoid additional uncertainty and mistaken responses to price signals, monetary interventions also ought to be communicated clearly.

2.3 Strict and flexible inflation targeting

The long time lags from money supply changes to subsequent price movements, and the interim real effects of monetary policy actions, are the major reasons that Svensson (1997) argues in favour of 'flexible' rather than 'strict' inflation targeting. Under strict targeting, the central bank is held accountable solely for maintaining the inflation rate within a narrow target range. By contrast:

Flexible targeting is when the central bank is to some extent also concerned about other things, for instance, the stability of interest rates, exchange rates, output and employment.

Nevertheless, any concern:

... with regard to these real variables ... is about their *variability* and not their average levels. It is not in the power of monetary policy to affect the long-run average levels of real variables.

One can think of flexible inflation targeting as constraining the severity with which monetary policy is used to control inflation. The central bank remains focused on the inflation rate as its primary goal, but is willing to sacrifice achieving that target if the real costs of doing so are too high.

As we discussed in the introduction to this chapter, more flexible targeting may, in practice, amount to altering the time taken before the inflation target is supposed to be achieved. The longer the delay until a target is achieved, however, or the more a target range is adjusted, the less credible will be the commitment to achieve it. The public is aware of the continual temptation to subordinate long-run goals to the avoidance of short-run costs. It is rational, therefore, to conclude that delays or adjustments reflect a lower probability that the target will ever be achieved.

Allowing for honest, or desirable, adjustments to the inflation target raises another difficulty. There may often be reasonable disagreement over whether any particular adjustment is justified. Even if a central bank is officially free of political interference

from the government of the day, it may be reluctant, for example, to take tough actions as an election date approaches. The bank may avoid taking necessary action so that it cannot be accused of acting in a political or partisan way. It may be difficult for the public to differentiate between adjustments that are honest, or based on reasonable economic judgments, and ones that are motivated solely by political considerations.

On the other hand, because the central bank has incomplete control over the average price level, asking the bank to maintain the inflation rate within a narrow target range is likely to invite a vigorous use of monetary policy instruments. Monetary activism aimed at attaining a tightly specified inflation goal is likely to come at a considerable economic cost. A strict inflation targeting policy would probably be infeasible in a large economy such as the United States, because the central bank does not have enough control over prices in the short run. In a small economy with a larger proportion of traded goods than the United States, a movement in the exchange rate can have quite a rapid effect on many prices and, thus, on a price index such as the Consumers Price Index (CPI). Even so, a large movement in the relative price of traded to non-traded goods is unlikely to be optimal. It will encourage large artificial movements of resources between sectors of the economy that are exposed to international trade and those that are not. A strict inflation target in a small open economy may encourage the central bank to intervene too frequently, and with a larger movement in the policy instruments than is desirable.

A large policy shock will ultimately also have a large effect on inflation. An even larger policy response in the opposite direction may then be attempted. The result may be growing instability in monetary policy and in the economy. The variability of inflation is likely to rise and many of the monetary policy shocks will be unanticipated, further raising efficiency losses.

The call for flexible inflation targeting might best be regarded as a call for moderation in the use of monetary policy. It is not so much a suggestion for what ought to be done as it is a warning about what ought not to be done. Rapid and severe changes in monetary policy impose costs on the economy and should be avoided. This does not imply, however, that output growth or employment should become a target of the central bank to be placed alongside the inflation target.

2.3.1 Monetary base rules

The potential for monetary policy to do substantial economic damage, coupled with its inability to do much good apart from stabilising inflation, has led many economists to advocate replacing monetary policy by a purely passive rule. The passive rules usually advocated in a fiat money regime involve fixing the level, or rate of growth, of some monetary aggregate.²²

²² As described in more detail in Chapter 5, other passive regimes involve fixing the price of some commodity (such as gold) or asset (such as foreign currency or a domestic government bond) and exchanging base money for that commodity or asset on demand. The classic gold standard is an example of the former type of regime while the currency board regime discussed in Chapter 3 is an example of the latter.

Money growth rules were first advocated by Milton Friedman as a way of removing central bank discretion from the implementation of monetary policy. They once enjoyed fairly widespread support among monetary economists, but fell into disfavour in the early 1980s when they were tried by many countries and were perceived to have failed. In our view, the primary reason for that failure was that the wrong monetary aggregates were targeted. Targeting of the money base has only been tried by Switzerland and Germany.²³ It may be significant that these two countries have also had the best inflation record of any of the major Organisation for Economic Cooperation and Development (OECD) economies since they adopted money growth targeting after the first oil price shock in the early 1970s. For example, the German CPI inflation rate remained below 8 percent from 1970–2000 while the Switzerland record was only slightly worse, with inflation in the early 1970s peaking at just below 12 percent.

The money growth rules that were tried in the early 1980s mostly targeted monetary aggregates, such as M1 or M3, that included inside money components. Unlike the monetary base, these aggregates are not entirely under the control of the central bank. The variable time lags between the changes in inside money components and the aggregate that the central bank does control (the monetary base) made the targeted growth rate difficult to achieve. Targeting aggregates that included inside money components also reduced the accountability of the central bank because the bank always had an excuse for missing the targets. Finally, targeting the growth rate of aggregates that included inside money components was usually introduced at the same time that restrictions on bank practices were relaxed. A consequence of relaxing the rules governing the behaviour of commercial banks, however, was that the determinants of the demand and supply of inside money components also changed. As central banks tried to limit the growth of some types of inside money, the newly freed financial intermediaries had an incentive to invent close substitutes that were not being targeted. The result was a widespread perception that controlling money growth rates was impossible and money growth targets were impractical as a means of constraining the activism of central banks.

As we argue in more detail below, the behaviour of the economy in the gold standard era is far more relevant to predicting the likely outcome under a monetary base rule than is the outcome achieved under most of the monetary targeting regimes of the early 1980s. The failure of money growth targeting in the early 1980s is not a conclusive argument against money base targeting when the targets used in the early 1980s included inside money components.

A monetary base growth rule (including freezing the base) has a significant advantage over rules that target wider monetary aggregates or the inflation rate. The monetary base

²³ In the case of Germany, the target variable was actually 'central bank money', which differed from the monetary base by excluding excess (above the required) deposits of banks at the Bundesbank and also by measuring required reserves at historical, not current, ratios (Bernanke, Laubach, Mishkin and Posen (1999), p 57). From 1988 until the formation of the ECB, the Bundesbank targeted a broader aggregate M3. Bernanke *et al* argue that the change in target variable was prompted by a shift between currency and inside money as a result of banking reforms and subsequently by German monetary unification.

is unambiguously under the control of the central bank, thus enabling greater accountability than rules targeting variables that the central bank can only indirectly or incompletely control. As we remarked above, the monetary base is equivalent to the liabilities of the central bank held by the private banks and public. By simultaneously altering its assets and liabilities, the central bank can control the money base.

In discussing the origins of the current inflation targeting rule, Reddell (1999) notes:

In the course of lengthy debate, there were suggestions that some form of monetary base measure (perhaps notes and coin in circulation, or that plus settlement account balances)²⁴ might be an appropriate output measure – something that the Bank could, in principle at least, directly control.

Reddell claims that this approach was not taken because:

It proved impossible to identify a stable connection between this particular *output* and the sort of ultimate *outcome* – price stability – our political masters were seeking from an independent²⁵ central bank. (Emphasis in original).

A problem with assessing the stability of the relationship between the money base and average prices using data prior to 1990 is that monetary policy in New Zealand during that period was anything but quiescent. The gyrations in exchange rates, interest rates, output and inflation resulting from activist monetary policy may themselves have helped obscure the relationship between the money base and prices.

Furthermore, when looking for a stable relationship between the money base and subsequent movements in prices or other variables, it does not make sense to combine data from a fixed exchange rate period with data from a floating rate period. Under a fixed exchange rate regime, the central bank forgoes controlling the money base in order to maintain the value of the exchange rate at a preassigned level. The central bank must buy or sell foreign exchange to maintain the fixed rate. As it does so, the assets of the central bank change as do its liabilities, that is, the monetary base. Under a fixed exchange rate regime, therefore, the monetary base responds to any shocks that alter the demand for foreign exchange in New Zealand. The money base becomes a lagged function of those shocks, making it difficult to discern an independent causal influence of the money base on subsequent movements in prices.

Under a flexible exchange rate regime, markets are allowed to determine the foreign exchange value of the New Zealand dollar. The Reserve Bank can then choose whatever level or rate of growth it wants for the monetary base. This allows the money base to

²⁴ Because Reddell uses “some form” and “perhaps” to describe the money base measure, he allows for the possibility that the ‘monetary base’ can mean something other than the liabilities of the central bank held by the private sector. Maybe this vague use of the term is what enables him to claim that the monetary base can only be controlled “in principle at least”. The way we have defined the monetary base, it can definitely be controlled by the central bank not only in principle but also in practice.

²⁵ Why would price stability be the ultimate outcome to be sought only from an independent central bank? By emphasising independence at this juncture, is there perhaps a subtle suggestion that tying the Bank to an unambiguously achievable goal, such as a monetary base rule, takes away from its independence or discretion?

move independently of current and past movements in interest rates, output, inflation, or the exchange rate if the bank so desires. The central bank, nevertheless, may choose monetary policy actions, and hence the money base, by responding to current and past movements in such variables. It also can choose to set an interest rate instead of the exchange rate. As with a fixed exchange rate, the central bank must then be willing to supply whatever base money the private sector demands at that interest rate. Any policy that makes the base money supply endogenous under a flexible exchange rate regime would also help to obscure any independent causal influence of the money base on subsequent movements in prices.

We conclude that endogeneity of the money base may make it difficult to discern an independent causal influence of the money base on subsequent movements in prices in either type of exchange rate regime. The problem is compounded when data generated under the two different types of exchange rate regimes are lumped together. The statistical relationships between other variables and the monetary base will almost certainly change from one regime to the next. This will tend to reduce the statistical significance of any estimated parameter values and lead one to conclude that no systematic relationship exists.

Monetary policy could be operated to ensure that movements in the money base are independent of current and past movements in interest rates, output, inflation, or the exchange rate, even if that has not been past practice. In particular, if exchange rates and interest rates are allowed to float freely, the central bank can choose whatever level of assets, and therefore liabilities, it wishes to hold.

In the above quote, Reddell overstates the requirements for achieving an acceptable outcome for the inflation rate under a money base targeting rule. The relevant question is not whether there was “a stable connection between” monetary policy and inflation in some historical period. Rather, the critical issue is whether the Reserve Bank could ensure that the inflation rate does not venture too far, or for too long, outside an acceptable band of rates by choosing an exogenous growth rate for the base while allowing interest rates and exchange rates to be market-determined. It is not necessary that there be “a stable connection” between the money base and prices or other variables. It is sufficient if the instabilities in the relationship remain within bounds.²⁶ For example, the lag between changes in the money base and changes in average prices may vary randomly even though price changes over periods of, say, five years correspond closely

²⁶ One technical definition of a stable connection between the money base and the price level would be that, even though both of these are ‘non-stationary’ time series, the two are ‘co-integrated’. This is unlikely to be true, however, because technological change and economic growth are non-stationary. The money base, prices, output and a measure of transactions technology are, however, likely to be co-integrated. Because growth rates in output and technological change are themselves limited, the deviation between inflation and money base growth rates will then also fall within a narrow band. In footnote 8 to the paper, Reddell associates an unstable connection with a linkage that is “too loose and changeable to provide a meaningful or reliable basis for formalised accountability structures”. To provide a basis for accountability, however, the specified output from the government agency merely has to be measurable and under the complete control of that agency. This is true of the money base, although not of any of the other indicators – the exchange rate, the interest rate yield gap, or some monetary aggregate broader than the base – that Reddell lists along with the base in footnote 8.

to growth rates of the money base over the same period. Any attempt to fit a fixed lag structure would reveal instabilities. The tighter relationship over moderately long periods is sufficient, however, to ensure that if the money base is kept fixed the inflation rate cannot deviate far from zero.

In the banking economy discussed in Chapter 5, for example, the inflation rate could be controlled by limiting growth in the money base, yet there need not be a “stable connection” between the money base and average prices. In that model, a change in the money base would have different short-run real effects, and different lags before money base changes subsequently affect prices, depending on which sectors of the economy first experience the effects of the money supply change. For example, open market operations will affect bond markets first, while foreign exchange market interventions will have their strongest initial impact on foreign capital flows and the traded goods sector. The lags between monetary policy actions and their effects will also depend on the sensitivity of different sectors of the economy to changes in asset prices or the supply of loans. Short-run links between changes in the monetary base and prices may appear unstable. In the longer term, however, changes in the money base will be closely tied to variations in the average level of prices.

As noted, changes in transactions technology and economic growth are two factors that would affect demand for the money base. These factors could be expected, under normal circumstances, to produce at least partially offsetting effects on the demand for the monetary base. Improvements in transactions technology will expand the demand for inside money at the expense of the base. On the other hand, economic growth will raise the demand for transactions assets of all kinds, including the money base. With random variations in these factors over time, the link between the money base and the average price level also will vary randomly over time. One doubts, however, that these factors, either alone or in combination, could produce serious instability in demand for the money base. With a fixed supply of base money, inflation (or deflation) can occur only if there is a continuing fall (or rise) in the demand for base money. In particular, technological changes that alter the demand or supply of different components of inside money will have no effect on inflation unless such changes also alter the demand for the monetary base. Freezing the money base would not eliminate price fluctuations, or even mild periods of inflation or deflation, but it is unlikely to lead to substantial deviations from the price stability objective.

A gap between the inflation rate and the base money growth rate requires a continuing sequence of changes in the demand for the money base that do not offset each other. Such an outcome is unlikely on *a priori* grounds. It is also inconsistent with the historical record on inflation in monetary systems based on metallic standards.

Many of the alleged deficiencies of a base money targeting regime, such as that it would produce unacceptable levels of interest rate volatility, could not guarantee price stability or would not control the supply of inside money, would also apply to a gold standard regime. In reality, however, monetary systems based on precious metals did not suffer from these defects. Unacceptably high inflation rates were experienced in such regimes

only when the coinage was debased, that is, when the strict gold standard regime was abandoned.

Under a strict gold standard, the money base fluctuates as the supply of gold, or the non-monetary demand for it, change. So long as the parity between the currency and gold remains fixed, the government or central bank forgo discretionary control over the monetary base. The government or central bank also forgo discretionary control of the monetary base under a strict money base growth rule. In contrast to a money base growth rule, however, the monetary base under a strict gold standard regime will grow at an indeterminate rate. As the value of gold rises relative to other goods or services (the average level of nominal prices falls), there is an incentive to mine more gold and expand the monetary base. Serendipity will also play a part in altering the supply of gold and thus the expansion of the base. Nevertheless, the gold standard era was characterised by periods of, at most, mild inflation or deflation.

Another objection to money base targeting is that few central banks have tried it. Quite possibly, central banks have rejected money base targeting on political, not economic, grounds. Money base targeting makes the central bank accountable like few other rules can.²⁷ In particular, the money base is the only money stock that the central bank can unambiguously control. No organisation likes to be held accountable for its actions. If possible, it is better for the organisation to choose an objective that allows for excuses when the objective is not met. In addition, the capture theory of regulation implies that we could expect central banks to serve the interests of their clients, the commercial banks, more than the public interest. For example, central banks could effectively subsidise the banking industry by eliminating seasonal movements in interest rates and freeing banks from much of the responsibility of managing their liquidity. One consequence of a money base rule is that a strong seasonal factor is likely to reappear in interest rates. In the early decades of the twentieth century, interest rates were strongly affected by an increased demand for transactions balances at Christmas time, and the reduction in base money supply when tax payments fell due. Central banks largely eliminated these seasonal movements when they began actively to target interest rates. Any losses that central banks make on their open market operations aimed at stabilising interest rates would, however, accrue to other participants in the bond markets, and thus operate as a subsidy to private financial intermediaries.

A secondary issue with respect to whether a base money growth rule is appropriate is the exact rate of growth that would be used as the output measure. In practice, errors in measuring prices make it difficult to distinguish between different rules with similar consequences for measured indices such as the CPI or the Wholesale Price Index (WPI).

²⁷ The accountability of the central bank is just as great under a gold standard regime or the currency board regime discussed in Chapter 3 because in those cases the bank can be held to its promise of exchanging an outside asset for base money at the prescribed rate. A central bank merely targeting a broad monetary aggregate (that includes inside money) or an interest or exchange rate can, however, always attribute a failure to achieve the target to forces beyond its control.

Freezing the money base has an advantage relative to a positive growth rate in that it does not require the central bank to intervene in financial markets through open market operations. Freezing the base will tend to produce price reductions following productivity improvements (and thus faster economic growth), and price increases following adverse shocks like a reduced energy supply or a drought. Selgin (1990) argues that such movements represent a pattern of price level adjustments that is preferable to stable consumer prices. He ignores the role of technological change in influencing demand for the base, however, and this could mean that the link between productivity changes and price level changes is much looser than he suggests.

A concern with freezing the money base is that a period of rapid growth in demand for the base might produce a sustained deflation. Nominal interest rates must, however, remain positive. Because people can always hold cash balances while incurring only a trivial storage cost, they would not lend money when they have to pay for the privilege of doing so. The lower bound of zero on nominal interest rates places an upper bound on the size of a sustained deflation. A large increase in the demand for the money base, as occurred during the Great Depression, is likely to lead to liquidity shortages and a run on the banks.²⁸ This has led some economists to advocate a rule that permits the money base to grow at a fixed, small, positive amount, for example, the normal real growth rate of the economy.

A money base rule with some low growth rate may have other advantages. It is likely to be relatively easy to communicate to politicians and to the public. In fact, there is historical evidence that people can readily come to appreciate that inflation will be virtually eliminated by a legal change that permits the money base to expand only as the demand for it increases. Major hyperinflations, such as those experienced in Europe in the period between the two world wars, were ended only by implementing base money rules. Other options, such as a currency peg or wage and price controls, were often tried without success.

The main problem with a strict money base growth rule is that adherence to the rule in the face of substantial shocks to the economy might accentuate fluctuations in output and employment. The gold standard era was characterised by periodic banking crises, in which the public lost confidence in the solvency, or more particularly the liquidity, of the banks and rushed to withdraw cash. This situation would be less likely under a money base targeting regime with a small positive rate of growth of the money base. It also may be less relevant in the current situation in New Zealand where the major banks are foreign-owned and have much larger and more diversified portfolios than New Zealand banks might have had in the past.²⁹

²⁸ Bank runs are discussed in more detail in Chapter 5.

²⁹ A referee pointed out, however, that hysteria over the so-called Y2K problem in January 2000 created a large demand for cash in New Zealand as it did in many other developed economies. Many people feared that automatic teller machines may cease to function on 1 January, 2000 and rushed to withdraw cash in the weeks leading up to that date. If banks had been unable to supply currency, bank runs may have occurred with potentially disastrous implications for the financial system. Under a money base targeting regime, however, the increased demand for cash would have produced higher interest yields on inside money and discouraged at least some depositors from withdrawing cash.

A deviation from a money base rule to allow the central bank to provide liquidity during a banking crisis might be an important consideration in establishing a base money growth rule for a joint New Zealand and Australian central bank. Just as the existing institutional arrangement in New Zealand allows for deviations from the agreed inflation target in response to supply shocks and other exceptional circumstances, a money base rule could be supplemented by special provisions to cope with extreme banking liquidity problems. These could, for example, permit a temporary expansion of the base when it is accompanied by a timetable for returning to the long-run growth path.

2.3.2 *Stabilising the inflation rate*

Reddell (1999) argues that the policy of targeting inflation arose after it proved difficult to identify a stable connection between “some form of monetary base measure” and price stability:

Eventually it was ... agreed that the Reserve Bank would not be held accountable for any particular *outputs*. Rather the focus would be on the desired *outcome* itself. Recognising the variety of influences on inflation, the Governor would be assessed primarily on the *judgments* the Bank exercised in pursuit of the outcome, and the way it responded to new developments. (Emphasis in original.)

Reddell then discusses some of the difficulties of using inflation as a target, noting in particular that it took some time to strike “the right balance between pre-specification, clear-signalling, and ex-post accountability”.

The first problem the Reserve Bank and the New Zealand government encountered under the new regime was the oil price increase that occurred when Iraq invaded Kuwait at the end of 1990. The Reserve Bank decided that the price increases might require it to renegotiate the Policy Targets Agreement (PTA). Reddell argues that frequent renegotiations would have defeated the purpose of establishing an “enduring foundation for monetary policy” and a search began for a way of allowing for *ex-post* accountability. Another consideration was apparently a desire to move away from strict inflation targeting to a more flexible approach. Sherwin (1999) states:

The initial move to inflation targets arose from a wish to influence inflationary expectations by stating clearly the government’s commitments. The hard-edged character of the targets emerged a little later, partly as a consequence of the Bank taking up the role of shaping general inflationary expectations through a vigorous external communications programme that stressed the Bank’s commitment to the targets and the governor’s personal accountability for achieving them ... the portrayal of the inflation target as hard-edged also carried risks given the lags and uncertainties in monetary policy decision making. A “strict” approach to inflation targeting encouraged a search for precision in calculating “core” or underlying inflation measures for accountability purposes and may have encouraged a shortening of policy horizons as the direct price effects of the exchange rate became more important to the achievement of the target outcomes.

A revised PTA was signed by the governor and the incoming minister of finance in December 1990. The new PTA listed examples of economic shocks that the Bank should accommodate after documenting its estimates of the effects of those shocks and explaining how it would return inflation to the target range.

Sherwin (1999) claims that the main criticisms of the current inflation targeting regime are that it has constrained growth and employment, and reduced exports by maintaining an over-valued exchange rate and excessively high interest rates. For example, Bernanke *et al* (1999, p 111) observe when commenting on the change in the inflation target range in December, 1996:

The premises of the Reserve Bank of New Zealand Act of 1989, the interpretation of inflation targeting as requiring inflation to be tightly controlled quarter to quarter, and the inherent limitations on what New Zealand's monetary policies could accomplish, created pressure for a more activist monetary policy in New Zealand than was originally intended. Further, the stringent requirements of inflation control caused harm to the real economy, notably the export sector, whose competitiveness was harmed by high interest rates and appreciation of the exchange rate.

Sherwin (1999) counters claims such as these by stating:

Our recent research programmes ... show that the 1991 to 1997 expansion was both long and strong relative to the cycles that preceded it ... Likewise the employment creation which accompanied that growth cycle was strong, both relative to the two previous decades and relative to the 1990s experience of our peer group in the OECD.

He also suggests that because the inflation rate has been "persistently above the mid-point of the target range" monetary policy could not have been much more accommodating. He argues that other factors explained the interest rate and exchange rate outcomes:

Factors such as the surge in immigration, the associated house price cycle, the strength of the external sector early in the cycle and the influence of fiscal policy go a long way to explaining why interest rates and the exchange rate behaved the way they did.

Finally, Sherwin asks what might have occurred had the monetary policy favoured by the critics been implemented:

The different monetary policy sought is generally an easier monetary policy. The most likely outcome of an easier monetary policy would have been higher inflation, a stronger and more sustained asset price cycle and, with that, the same sort of pressures on the real exchange rate and tradeables sector as were experienced – albeit over a more extended period of time.

The anti-inflationary performance of the current regime in its first decade has been exceptional, particularly relative to the monetary policy New Zealand experienced from 1974 to 1990 (the reader is referred to figure 1 in Sherwin's paper). As Bernanke *et al* (1999, p 114) observe in their concluding paragraph on New Zealand:

[I]nflation targeting in New Zealand has, on the whole, been highly successful. This country, which was prone to high, volatile inflation before the inflation-targeting regime was adopted, has emerged as a country with low and stable inflation. Moreover, this has been accomplished as part of an overall package of reforms which has promoted and sustained substantial economic growth and modernisation.

The 1991 to 1997 expansion in New Zealand was exceptional relative to expansions in the previous two decades. Some economists might have hoped, however, that the many

microeconomic reforms undertaken in New Zealand in the 1980s and early 1990s would have had an even greater positive impact on productivity, output and income growth.

Perhaps the 1991 to 1997 expansion might have lasted longer (as it did in Australia) had not the Reserve Bank followed, in the words of Sherwin (1999), such “a ‘strict’ approach to inflation targeting” early in this period. As he observes, the strict approach “may have encouraged a shortening of policy horizons as the direct price effects of the exchange rate became more important to the achievement of the target outcomes”.

A potential problem with the inflation targeting regime is that it focuses on the rate of inflation achieved over a previous 12-month period. If the inflation rate is threatening to fall outside the specified target range, the Reserve Bank has an incentive to tighten policy in the hope that the deflationary effects of an exchange rate appreciation can quickly get the inflation rate back on target. While the inflation targeting regime has eliminated monetary activism aimed at stabilising real variables, it may have reinstated monetary activism in the guise of aggressively manipulating the exchange rate to achieve the required inflation outcome.

Svensson (1997) suggested that the inflation projection may be a suitable alternative intermediate target:

A good intermediate target is such that, if you aim for it, it helps you achieve the ultimate target. The best the Bank can do is to adjust monetary policy conditions such that the corresponding inflation *projection*, the *intermediate* target variable, is on target at an appropriate horizon ... Of course, *ex post*, when time has advanced and we find ourselves at that horizon, actual inflation will deviate from the projection, and hence from the target. That is unavoidable, because of the uncertainty inherent in the situation, and because shocks occur in the period intervening between the monetary policy action and the effect on inflation. (Emphasis in original.)

Using the inflation projection as a target may provide the central bank with a way of reconciling the desire for accountability and of avoiding monetary activism with an interest in achieving a long-run inflation rate as the outcome. The Reserve Bank has used its inflation forecast (derived by evaluating its proposed future monetary policy actions using its own model of the economy) as an intermediate target for some time. The Reserve Bank publishes its forecasts and the thinking that underlies those forecasts. The proposal here would go further and replace the actual inflation rate in the PTA by the expected or projected inflation at, say, a two-year horizon. The Reserve Bank would be held accountable for achieving an outcome for expected future inflation instead of for achieving a realised inflation rate within a specified range.

At first glance, it might seem that the inflation rate expected in two years' time could be measured by the difference in interest rates on nominal and indexed bonds with two years to maturity. Investors in the indexed bond will receive an indexation adjustment to the face value equal to the inflation actually experienced over the two-year period. By contrast, investors in a nominal bond will suffer a loss in real terms equal to the inflation rate multiplied by the amount invested in the bond. It might be thought that the different yields on the two bonds could be taken as a reliable guide to the inflation rate investors

expect to encounter. The Reserve Bank could then be instructed to target this yield difference.

A major advantage of targeting changes in the differential yield on nominal and indexed bonds is that this is a variable determined by markets. It results from people using their own money to back their forecasts of what might happen. No other measure of expected rates of inflation has this attribute.

A potential disadvantage of targeting the differential yields on nominal and indexed bonds is that the different interest rates will reflect factors other than the expected inflation rate. Because the inflation rate is random, the yield on the nominal bond will include a risk premium to compensate risk averse investors for the inflation risk. As long as this risk premium is constant or evolves gradually, however, changes in the differential interest rate on nominal and indexed bonds would remain a reliable guide to changes in inflation expectations. The central bank could be instructed to target changes in this yield differential.

Another potential difficulty with targeting the yield spread between nominal and indexed bonds is that the market in indexed bonds is much less liquid than the market for nominal bonds. Furthermore, targeting the yield differential could further reduce the liquidity of the indexed bond market by making nominal bonds and indexed bonds closer substitutes for each other.

The yield on the indexed bonds will include a component to compensate for their reduced liquidity. More importantly, the lack of liquidity in the market for indexed bonds may lead to variable market prices for such bonds. The interest differential on the two types of bonds thus may be an unreliable indicator of the expected average rate of inflation. The liquidity problem might perhaps be handled by measuring changes in the yield differential between one tender date and the next (so the changes are measured on the primary market, not the secondary market).

Bernanke and Woodford (1997) raise a more fundamental objection to using nominal and indexed bonds to derive an expected inflation target. If bond traders know that the Reserve Bank is targeting the interest differential on such bonds, they will have an incentive to set the interest differential equal to the targeted amount. Traders will come to expect that monetary growth rates will become whatever is required to produce the targeted spread between yields on nominal and indexed bonds. The observed differential may then cease to carry information about anything other than the chosen target rate. Private traders will cease to have an incentive to gather information about any other possible determinants of future inflation, so the interest rate differential cannot reflect the effects of such information.

Another approach could be based on forecasting inflation using structural models of the economy.³⁰ As Bernanke and Woodford suggest:

³⁰ A variant of the inflation forecast targeting scheme could accommodate the preference of Selgin (1990) for stabilising nominal output. One could simply replace a target range for forecast inflation by a target range for forecast nominal output.

[O]ne might seek to ensure central bank accountability by mandating public testimony as to the bank’s success in keeping inflation forecasts on target ... or even to impose penalties under a “central banker’s contract” for deviations of inflation forecasts from the target level.

Bernanke and Woodford comment that the forecast should not only be:

... prepared with the use of a structural model, but that the model and data on the current state of the economy are used to determine policy action that, according to the model, should result in a forecast of inflation equal to the target.

They observe that by using inflation forecasts produced by a structural model of the economy the forecasts do not suffer from the problem of endogeneity that affects reduced form private sector expectations of inflation:

[F]or successful implementation of inflation targeting, there appears to be no substitute for explicit structural modelling of the economy and extensive information gathering by the central bank. Private-sector forecasts, and forecasts inferred from financial markets, should be part of the information gathered by the bank, but they should be combined with other information in the making of policy.

Under the current regime, the Reserve Bank uses the inflation forecasts from its model of the New Zealand economy to justify its policy stance. This approach could be turned into an accountability measure by requiring the Reserve Bank to achieve a probabilistic outcome for the inflation projection over a time horizon, such as the next two years. For example, suppose the desired range is 0–2 percent. The Reserve Bank could be required to set policy so that the probability that the projected inflation rate falls within the 0–2 percent range throughout the following two years is 90 percent or greater.³¹ The idea is illustrated in Figure 2.1. Unexpected shocks that occur over the next two years could

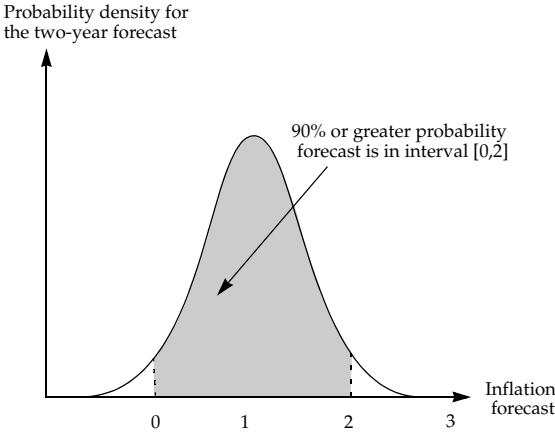


Figure: 2.1: Targeting the inflation forecast

³¹ These are illustrative numbers only. The target range, forecasting horizon, and probability value could all be varied to help achieve the most desirable outcome.

take the actual inflation rate outside the 0–2 percent range. Although the Reserve Bank would not be held accountable for those deviations, it would need to design a policy that can be expected (on the basis of the best available forecasts) to bring inflation back into the target range for a sufficient proportion of the following two years to meet the 90 percent rule.

It might be thought that this proposal would simply give the central bank an incentive to choose monetary policy to target the centre of the inflation range. This would appear to be the case if the forecast error, graphed in Figure 2.1, were symmetric about its mean value. An inflation projection rule would also give the bank an incentive, however, to ensure that inflation did not become too unpredictable at a two-year horizon. If the variance of the inflation prediction increases, Figure 2.1 shows that it would become more difficult for the Reserve Bank to ensure that the probability that the projected inflation rate falls within the 0–2 percent range is 90 percent or greater. The tendency of an inflation projection rule to improve the predictability of the inflation rate is another advantage relative to a rule based on past actual inflation rates. Many of the costs associated with inflation arise from its unpredictability as much as from a change in its average level. In order to improve the predictability of the inflation rate, the Reserve Bank would have an incentive to avoid dramatic and unanticipated swings in monetary policy.

Focusing on projected inflation rates at a medium-term horizon would reduce the incentive to use large changes in monetary policy to ensure that a looming inflation target is achieved. The policy may also avoid the need to specify the shocks that would excuse the central bank from attaining an *ex-post* inflation target. Any unanticipated shocks that take the actual inflation rate outside the target range would be excused. Shocks that are reflected in the model forecast would, however, require a proposed policy path that would be expected to offset the effects of the shocks over the following two-year horizon.

An obvious question is which model should be used to make the inflation forecast? Perhaps the proposed monetary policy actions could be evaluated using a number of different structural models of the economy. The weighted average of the forecast inflation rates from these models could be used as the target. The weights could be increased in line with the forecast accuracy of each model.³² This scheme may have the added benefit of stimulating private forecasters to improve the accuracy of their models, which in turn would be of benefit to businesses trying to make investment decisions.

The major problem with this approach is that forecasting models of the economy may not be sufficiently reliable. The actual inflation rate could deviate from the projected rate by a substantial amount. Inaccurate forecasts would also result in a large variance for the probability distribution in Figure 2.1. This variance will in turn require a low value for the probability that the projected inflation rate falls within the target range. The rule

³² To allow for the issue that Bernanke and Woodford (1997) discuss, the forecast accuracy of each model would be measured using a number of economic variables, and not just the inflation rate.

would impose only weak discipline on the Reserve Bank. The Reserve Bank may then become more vulnerable to political interference, and the inflation outcome may deviate substantially from the desired range.

A third approach to reducing the incentive to use monetary policy aggressively could involve lengthening the time period over which the inflation rate is measured. For example, instead of being required to achieve an inflation rate of 0–2 percent in a one-year period, the Reserve Bank might be required to achieve inflation of 0–4 percent over a two-year period. The longer time horizon may allow the Reserve Bank to accept greater short-run variation in inflation, while still achieving the long-run goal. Once again, however, the greater flexibility might be misused to pursue goals other than inflation. Furthermore, if the inflation rate is allowed to deviate too far from the target range, people may lose confidence that inflation will be brought back under control. Finally, if the rate is out of the target range as the end of a two-year measuring period approaches, the Reserve Bank may still have an incentive to use strong monetary policy to try to bring the rate back within the required range.

2.3.3 *An ‘either or’ rule*

Another approach to increasing the accountability and passivity of monetary policy could combine monetary base targeting with inflation targeting. Specifically, the Reserve Bank could be required to adhere ‘either’ to a base money growth rule ‘or’ an inflation rule. A failure to achieve the requirements specified by one of these rules would be excused so long as the Reserve Bank satisfied the other rule over the same time interval.

The primary difficulty with a money base targeting rule is that adhering to the rule in the face of a large increase in the demand for the base is likely to create a liquidity shortage with potentially serious ramifications for the banking system and economic stability more generally. If there is a large increase in the demand for base money, however, then a corresponding increase in the supply of base money would not be inflationary. Suppose the Reserve Bank had a base money growth rule. It would be reasonable to excuse the bank from complying with that rule if an increase in the demand for the base is concomitant with an increase in the supply. In such a situation, a large increase in base money supply should be associated with a low inflation rate. The Reserve Bank could thus be excused from complying with the base money growth rule so long as the inflation rate was on target.

The major problem with an inflation target is that the Reserve Bank does not have complete control over the inflation rate. A strict target encourages the bank to use activist policy as the time horizon for achieving the target approaches. The Reserve Bank can be held responsible for an unacceptably high inflation rate only if it has been excessive in expanding the supply of base money. If inflation is outside the target range for reasons that are beyond the control of the Reserve Bank, however, then the bank ought not to have increased base money growth rates outside the base money growth rate target range. Under an ‘either or’ rule, the bank would be excused from missing its inflation target so long as the base money growth rates remained within their target range.

Excessively activist policy in pursuit of the inflation target should be revealed in very high or very low rates of base money growth. A constraint on base money growth rates, therefore, may constrain the policy activism of the bank in pursuit of its inflation target, but in a way that would guarantee that the inflation rate could not get out of hand. While the inflation rate could deviate from the target range under this policy, the constraint on base money growth rates would limit how far inflation could deviate from the target range in the long run. Knowing that base money growth was under control should also help anchor expectations about the possible future path of inflation even if current inflation rates are seen to depart temporarily from the target range.

Because there are long and variable time lags between changes in the money supply and subsequent changes in prices, there may be an argument for measuring the inflation rate and base money growth rates over different time intervals. It may make sense, for example, to measure the average annual base money growth rate over the previous three years, while basing the inflation target on annual rates. In order to maintain a bias against monetary activism, however, the target range for the base money growth rate would need to be narrowed if the growth rate is averaged over a longer period.

2.4 New approaches to monetary policy?

The suggestions for modifying the inflation targeting regime that were discussed in this chapter were motivated by an intention to avoid the undesirable real effects of monetary policy activism in the name of fighting inflation. The problem is activism, however, rather than the underlying target. In particular, these reservations do not justify aiming monetary policy at short-run real targets.

There are many potential dangers in focusing on the short-run real effects of monetary policy. A central bank can completely control the supply of base money and only indirectly influence the demand for base money and other variables.³³ It follows, therefore, that monetary policy can be directed at a limited number of goals. The only sensible long-run goal is the inflation rate. Inflation is a concern of policy, and no other policy instrument can achieve a desired inflation outcome if monetary policy is not set appropriately. Even if monetary policy were useful for achieving other goals, its comparative advantage lies in aiming at the inflation target.

The conduct of monetary policy is complicated by two other facts. The first is that the time lags between monetary policy actions and their effects on inflation can be long and variable. We argue in Chapter 5 that the lags between changes in monetary policy and the inflation rate will depend on the way monetary policy actions are implemented.

The second complication affecting monetary policy is that changes in money base growth rates do not by themselves determine the inflation rate. Changes in demand for the

³³ The central bank also can influence, although not completely control, the demand for the base by changing the interest rate it pays on bank reserves. A change in this discount rate is also likely to affect the interest rate that banks pay on deposits and, thus, also affect the demand for inside money.

money base will also be important determinants of the inflation rate. Because most factors affecting demand for the base are beyond the influence of the central bank, the central bank cannot be held accountable for achieving a strict inflation target.

Because the price effects of a given monetary action will be spread over time, the inflation target places a constraint on the accumulated change in the money base between now and the target horizon. This appears to endow monetary policy with an additional degree of freedom, because the same accumulated result is consistent with many different time paths of changes. The freedom of action is, however, not as great as it appears. If action is not taken at an ideal time in order to achieve a desired inflation outcome, the actions required closer to the target date may need to be more vigorous. For example, lesser variability in output and other variables early on in the planning horizon may be obtained only at the expense of much greater variability in these same variables as the target date approaches.

We examined a number of ways of increasing both the accountability of the central bank and the passivity of monetary policy. The merits of these respective ideas would need to be investigated in more detail. Although there are sufficient grounds to investigate possible modifications to the inflation targeting regime as currently practised in New Zealand, it is by no means obvious that the current regime can be improved upon.

The first idea for modifying the current inflation targeting regime follows a suggestion of Svensson (1997) that the inflation target could be replaced by an inflation forecast target. The central bank would be held accountable for achieving an explicit forecast inflation rate as opposed to some past actual rate. There are, however, serious doubts about the practicality of an inflation forecast targeting regime.

A monetary base growth rule may be preferable to an inflation targeting rule on the grounds of both accountability and passivity. It would require the central bank to achieve a target it certainly is capable of achieving. A monetary base growth rule would not guarantee price stability. As in the gold standard era, however, deviations between the inflation rate and the rate of growth of the money base would be limited in duration and magnitude. The history of the gold standard era also points to a major potential flaw of a monetary base targeting regime. Economic shocks can increase the demand for base money. If that increased demand is not accommodated, there is a possibility of severe disruption of the financial system and the real economy as depositors scramble to obtain access to the limited amount of base money that is available.

The third proposal discussed in this chapter was to modify the inflation targeting rule by combining it with a money base growth rule. Whereas an inflation target focuses on the desired outcome of monetary policy, a money base rule focuses on the policy instrument under the control of the central bank. The idea behind this 'either or' rule is that the central bank should be relieved of responsibility for inflation falling outside the target range if the bank can show that it has used its policy instrument prudently. On the other hand, the central bank should be permitted to allow base money to grow outside a base money target range if it is responsible to do so. The latter circumstance would be

indicated by an inflation rate that is within a desirable target range in spite of the high rate of base money growth. The hybrid rule would have an additional advantage over either rule in isolation from the perspective of public relations. It would emphasise the responsibility of the bank for achieving an acceptable outcome with regard to inflation. At the same time, the public would be made aware that the allowable growth in base money was being monitored. This is likely to enhance confidence that the inflation rate could not get out of control.

ALTERNATIVE MONETARY ARRANGEMENTS

3.1 Monetary policy and globalisation

As the world moves into the twenty-first century, globalisation appears relentless. The falling cost of transport and communications has increased the movement of goods, capital and people among nations. For example, the 1999/2000 World Development Report from the World Bank observes that "Trade in goods and services has grown twice as fast as global GDP in the 1990s".

In addition to expanding the volume of world trade, improved transport and communications services have facilitated increased specialisation and integration of world manufacturing. Large manufacturing firms now often have specialised plants in many countries, or sub-contract with firms in other countries, to take advantage of the differing relative resource endowments, or comparative advantages, of different locations. The World Bank reports that the trend is difficult to document because most countries do not separate their trade statistics into final and intermediate goods. The World Bank claims, however, that "in the early 1990s one-third of all manufactures trade (approximately \$800 billion) involved parts and components".

Increasing trade and specialisation allow small economies, such as New Zealand, to exploit the productivity gains associated with becoming part of a much larger global economy. In order to continue to grow and prosper, New Zealand must remove the artificial barriers hindering its integration into the new world economy.

Another trend that the World Bank notes is the increase in international migration:

Along with goods, services, and investment, people are crossing borders in record numbers. Each year between 2 million and 3 million people emigrate ... At the beginning of the 21st century, more than 130 million people live outside the countries of their birth, and that number has been rising by about 2 percent a year.

This trend is of particular relevance to New Zealand as a small English-speaking country in a large English-speaking world. If New Zealand does not provide productive employment opportunities for its citizens, there are increasing opportunities for those citizens to live and work abroad.

The papers by Hargreaves and McDermott (1999), Grimes *et al* (2000) and Coleman (1999) that were discussed in the Introduction all identify greater integration of New Zealand into the world economy as the major potential benefit of abandoning the New

Zealand dollar in favour of the US dollar. New Zealand is a long way from most of its markets and potential sources of low cost goods or services. Distances matter for trade, and as Coleman points out:

By the standards of small wealthy countries, New Zealand has a low level of goods trade, and therefore appears to use trade to compensate for its small size less than other small economies. In fact, the median level of goods trade [measured by the ratio to GDP of the average of imports plus exports] by small wealthy countries is 30 percent higher than in New Zealand.

None of the papers presents strong evidence that flexible exchange rates greatly lower the volume of international trade. Even a small hindrance to trade might, however, have significant economic costs if trade is already reduced by other impediments. As Grimes *et al* summarise the argument for a monetary union with Australia:

Two relatively small neighbouring countries with much in common can assist one another to become stronger in international competition if they foster specialisation of production and exchange of goods and services in the CER region. Having two separate currencies is an impediment to such economic integration. All who have to exchange one currency into the other face the costs of exchange transactions.

Those involved in or planning to become involved in trade or investment across the Tasman face uncertainties about the returns they will derive because the exchange rate will fluctuate. The financial market for a small open economy with its own currency is rather limited, illiquid and subject to speculative pressures because of its lack of depth. Producers and consumers would benefit from integration into a more efficient financial system with greater liquidity and more attractive financial instruments.

The elimination of the currency barrier could be a stimulus to greater trade across the Tasman in goods and services generally, including trade in some primary industries.

Similarly, Coleman argues that New Zealand is much less economically integrated with Australia than the separate Australian states are integrated with each other.³⁴ As indirect evidence, Coleman notes that real exchange rates vary more between Australia and New Zealand than between the Australian states:

During the last 30 years real exchange rate volatility between Australia and New Zealand has been ten times as large as real exchange rate volatility between the different states. In the last five years real exchange rate volatility between Australia and New Zealand has diminished substantially, but is still greater than between the separate Australian states.

The implicit assumption behind this statement is that increased trade helps reduce relative price fluctuations by exploiting arbitrage opportunities that would otherwise persist. By retarding trade, exchange rate volatility helps arbitrage opportunities persist. Nevertheless, Coleman acknowledges that:

³⁴ The Australian and New Zealand economies were, of course, much less integrated before the Closer Economic Relations (CER) agreement was entered into. Furthermore, as Grimes *et al* note:

The first decade or so since [monetary] deregulation was marked by the necessity to combat what appeared to be endemic inflation. Now that inflation is under control, one might hope that the magnitude of real exchange rate swings might lessen.

... it has proved difficult to test whether long term exchange rate uncertainty has an adverse effect on trade.

Hargreaves and McDermott suggest that “access to hedging instruments” may help to explain the inconclusive evidence on the effects of exchange rate volatility on trade, capital flows and investment. Hedging foreign currency receipts or liabilities in the forward foreign exchange markets allows firms to reduce the uncertainty of exchange rate fluctuations. The ability to hedge exchange rate movements would, however, lessen the asymmetry between trade involving a common currency and trade involving different currencies. We would still be left with the puzzle of explaining why arbitrage opportunities (as indicated by real exchange rate volatility) are apparently less completely exploited between countries than within them.

Perhaps the statistical results on the effect of exchange rate volatility on trade are weak because it is only possible to measure the effects on firms that are already engaged in trade. The major effect of exchange rate volatility may be to discourage small firms in particular from embarking on foreign trade. The fixed costs associated with developing the expertise to manage foreign currency receipts and expenditures would be more of an impediment to small than to large firms.

If small firms have less expertise in handling foreign currency we might expect to find them less involved in using forward exchange cover. Grimes *et al* present the results from a survey of about 400 New Zealand firms. Focusing on firms that export more than 10 percent of their total sales to Australia, the authors found that 80 percent of the firms with fewer than 25 employees do not hedge any of their Australian dollar exposure, compared with 7 percent who fail to do so amongst firms with more than 50 employees. They comment:

This evidence is striking. It indicates that small exporting firms (to Australia) may benefit very substantially from the adoption of a common trans-Tasman currency.

A common currency would no longer place small firms that cannot afford to develop expertise in handling foreign currency risks at a disadvantage relative to their larger counterparts.

It is also interesting that when Grimes *et al* examined support for monetary union with Australia by firm size, the strongest supporters were firms with 11–20 staff members. Grimes *et al* comment that this may be because such firms:

... are at a size where exporting (especially to Australia) is becoming a relevant business growth prospect.

As Coleman notes:

The adoption of the Euro will provide more evidence in due course. Until then, however, it seems unlikely that economists will be able to make convincing estimates of the extent to which currency unification enhances goods market integration.

As we noted in the Introduction, the main proposals for eliminating the New Zealand dollar involve New Zealand forming a monetary union with Australia, or adopting the US dollar as a local medium of exchange.

3.2 Monetary union

We agree with Grimes *et al* (2000) that Australia is the only feasible partner for a monetary union with New Zealand. Monetary union requires the partner countries to agree upon the constitution of the new central bank. Australian and New Zealand governments have already shown they can cooperate on implementing many policies that have proven to be of mutual benefit, including reducing or removing barriers to trade in goods, services and financial assets and allowing the free movement of people between the countries. The shared history, language and legal frameworks of the two countries would also facilitate monetary union. Most importantly, both countries are currently pursuing very similar types of monetary policies (with Australia following the lead of New Zealand) and this should facilitate agreement on the principles that ought to govern a joint central bank. New Zealand would be much more of a junior partner in a monetary arrangement involving the United States, Japan or the European Union and could not expect to have any say in the rules governing the monetary policy chosen by the larger partner.

Forming a monetary union with Australia represents, at best, a medium- to long-term goal for altering the institutional framework of monetary policy in New Zealand. A monetary union with Australia would require that the current New Zealand interest in these issues spread across the Tasman. Even if both the Australian and New Zealand governments wished to pursue the idea, negotiations over the institutional arrangements would take time. For example, the Australian states may want a say in the composition of a board of governors for the new central bank. It also might be advisable to see how long the European Central Bank lasts, or how it copes with future problems, before concluding that such a supra-national central bank is a good way of supplying base money.

If a currency union were considered a realistic long-term goal, preparing for it may influence attitudes toward what changes, if any, ought to be made to current institutions in New Zealand. Monetary union with Australia would not solve the problem of designing a joint monetary policy. As a sovereign nation, New Zealand cannot be forced to adopt an institution against its will. New Zealand would have to accede to the principles that would govern the operation of a joint central bank.³⁵ The New Zealand government, therefore, would need to decide the position it would take in any negotiations with Australia.

Joining a monetary union with Australia might require New Zealand to reconsider one aspect of monetary policy that it can avoid to some extent in its current situation. As noted in a Reserve Bank press release on 20 June, 2000:

In New Zealand the current policy is that there is no government or Reserve Bank guarantee of banks or bank deposits. There is also no system of deposit insurance. Depositors and other

³⁵ In international bodies, each country has a single vote on the issues regardless of its size. Similarly, in federal systems, each state has to agree separately to the proposed constitution, and constitutional amendments typically have to be approved by enough states (independently of the overall vote) before they are valid.

creditors of banks should operate on the presumption that, if a bank were to fail, the government would not insulate them from losses ...

It is up to bank customers to make their own judgments about the soundness of the banks that they deal with. Indeed the supervision system that we operate ... ensures that bank customers have sufficient information to form their own judgments about the financial stability of the banks with which they deal.

One factor that may have allowed New Zealand to be more relaxed than other countries about designing policies to reduce the possibility of a bank run is that the major banks operating in New Zealand are local branches of overseas banks.³⁶ The New Zealand business of these banks is a relatively small part of their overall business, and their solvency is unlikely to depend on what happens in New Zealand.

The situation may be a little different in a monetary union with Australia. Many of the banks operating in both countries would have almost all their performing assets as loans to Australian or New Zealand entities. A joint central bank may need to look more carefully at the issue of bank runs than would the current Reserve Bank in New Zealand. In commenting on the paper by Bordo and Jonung (2000), Eltis observes:

In the 1990s the non-performing loans of Japanese banks reached 30 percent of GDP (according to Japanese government sources). The Japanese authorities have now taken over banking debts amounting to more than 10 percent of GDP to prevent systematic banking collapses. The knock-on effects of bank failures in the 1930s caused unemployment in the US, Germany and Austria to rise from the 10 to 15 percent which is normally experienced in a severe depression to between 25 and 40 percent. A post-Second World War recognition of the consequences of systematic banking failure led the US authorities to respond to the Thrift and Loans crisis of the 1980s by taking over bad debts amounting to about 9 percent of GDP.

It could be argued that the Japanese and US Thrift and Loans crises may have reflected the availability of inappropriate deposit insurance arrangements rather than indicating the need for such arrangements. It might also be argued that the Great Depression represented a mistake in central bank policy, that the lesson has now been learned, and the situation is less likely to recur. Nevertheless, there may be an efficiency argument for a central agency providing some kind of lender of last resort function. It is not clear whether the current arrangements in New Zealand and Australia are consistent with providing assistance with illiquidity, but not insolvency, problems but it is an issue that would need to be discussed when forming a joint central bank.

3.2.1 Major anticipated benefits of a monetary union

The papers by Hargreaves and McDermott (1999), Grimes, Holmes and Bowden (2000), and Coleman (1999) that were discussed in the Introduction all framed the issue of monetary union with Australia in the same terms. The major potential costs were seen to

³⁶ This is not meant to imply, however, that policy toward deposit insurance or bank runs ought to be different if many of the New Zealand banks operated only in New Zealand. It is more likely to be the case that most other countries have erred in the direction of providing too many government guarantees of banks and their customers. Bank runs are discussed in more detail in Chapter 5.

be the loss of a flexible exchange rate as one adjustment mechanism for shocks affecting the New Zealand economy. Grimes *et al* also mentioned the sovereignty issues, but suggested these were not the proper focus of a book examining the economic implications of alternative currency arrangements.³⁷ The major potential benefits were seen to be reduced transactions costs and greater integration of the New Zealand and Australian economies. Lally (2000) argues that monetary union with Australia would not reduce interest rates or the cost of capital in New Zealand by any appreciable amount.

While not wishing to minimise the importance of these considerations, we suggest that political influences on the nature of the central bank are another major issue. Both the Australian and New Zealand Reserve Banks now have, to use treasurer Cullen's words, "the maintenance of price stability as the primary function of the Bank". This focus may, however, be undermined by future governments wanting the Reserve Banks to be more flexible in their approach and place greater weight on "undesirable instability in output, interest rates and the exchange rate", again to use treasurer Cullen's words. If negotiations to form a monetary union were begun in the next few years, Australia and New Zealand might follow the example set by the ECB and make the maintenance of price stability the "primary function" of the new joint Central Bank. A future government in either Australia or New Zealand might find such an international agreement much more difficult to alter than the arrangements governing the operation of either of their Reserve Banks in isolation. In other words, instituting a common monetary authority may act as a form of precommitment. This type of argument has a long history with respect to membership of other 'international clubs' including the World Trade Organisation.

3.2.2 *Would Australia be interested?*

There are a number of reasons why Australia could be interested in a monetary union with New Zealand. The first is that the current Australian government may also see some benefit from making it more difficult for a future government to change the focus of the Reserve Bank of Australia away from controlling inflation.

The transactions benefits of a common currency may also be of interest to Australia. Successive Australian governments have supported the CER agreement that removes barriers to trade in goods and services between the two countries. Monetary union can be seen as another step in that process. Perhaps monetary union would accelerate integration of the capital markets on both sides of the Tasman just as lower tariffs and free movement of people have helped reduce barriers to trade in goods and services.

The Australian government might also value the increased foreign exchange market liquidity that is likely to accompany increased use of a joint currency. As it is, however, the Australian dollar is among the five or six most widely traded currencies in the world.

³⁷ The authors claimed no expertise in judging what might or might not be politically feasible as opposed to being economically desirable. However, as the position of the United Kingdom regarding European monetary union demonstrates, the sovereignty issues could be of paramount importance.

Finally, the different structure of New Zealand exports and imports may lessen the sensitivity of the value of a joint currency to shocks to the world prices of energy and base metals. This may benefit the manufacturing and farming industries in Australia. In particular, farming interests in Australia might welcome an exchange rate that is more sensitive to world prices of agricultural products and less sensitive to mineral prices.

Nevertheless, the political difficulties of a monetary union between Australia and New Zealand ought not be under-estimated. New Zealand is unlikely to agree to a monetary union without having an equal say in the policies that govern the operation of the bank. New Zealand might even demand a structure that gives it an equal say in the daily conduct of policy by the joint bank. Australia is unlikely to accept the latter approach. European monetary union may provide a precedent for handling these and related political issues. Given the importance of the European experience, however, monetary union between New Zealand and Australia is unlikely to be feasible before we have had enough experience with the European Central Bank to be confident that it has been a success.

3.2.3 *Other possible benefits*

Another potential benefit of an agreed monetary framework is that it may also result in stronger limitations on budget deficits than currently exist. All governments in the region (the Australian states too) would be borrowing in the same currency. Lenders may reasonably conclude that any one government threatened by default might lobby for expanding the money supply. Increasing the risk of default by one government, therefore, may raise the borrowing costs of the others. To forestall such problems, a monetary union between Australia and New Zealand would require an agreement limiting the extent to which the partner governments (including the Australian states) can issue debt denominated in the common currency. If New Zealand can ensure that the fiscal framework is a good one (for example, by ensuring the principles underlying the Fiscal Responsibility Act 1994 are the basis of the agreement), a supra-national arrangement may again cement desirable institutions more firmly in place.

On the other hand, if monetary union occurs in the absence of such an agreement on fiscal restraint, the outcome could be quite undesirable. The risks of default by individual governments may rise, increasing the costs of finance for all governments in the region, including New Zealand's. Harmonisation of fiscal policies across the Tasman also may reduce the amount of regional experimentation with different economic policies. This could make both countries worse off, because it reduces the chance that either country will learn from the mistakes and successes of the other.

3.2.4 *Potential costs of monetary union*

The major potential cost of monetary union is presumed to be reduced flexibility to use monetary policy to control output or employment growth in New Zealand. Representation on the board of a joint central bank is likely to reflect the economic size of the two economies. As Grimes *et al* (2000) point out, however, representatives from at

least some Australian states might occasionally favour the same activist policy that a New Zealand government might endorse.

More to the point, we argue in Chapter 2 that activist monetary policy ought not to be used for promoting output and employment goals.³⁸ It follows, therefore, that foreclosing that option may yield benefits rather than costs.

On the other hand, we also argued in Chapter 2 that a concern about the potential output effects of excessive policy activism should constrain the pursuit of the inflation goal. It is possible that business conditions in Australia could differ from those in New Zealand so that, at any one time, more vigorous anti-inflation policy could be more appropriate for one economy than it is for the other. It is also likely, however, that monetary union would make business cycles in the two economies more coordinated.

We nevertheless suggest that New Zealand should not agree to form a joint central bank unless such a bank were restricted to following a more passive money base growth or inflation targeting rule as discussed in Chapter 2. From a political economy perspective, the New Zealand government might be more willing to support an automatic rule of this sort for a joint central bank than it would for an independent Reserve Bank of New Zealand. The government might otherwise fear that activist policy would be used by a joint central bank to further the short-run goals of some interests in Australia at the expense of people in New Zealand.

There is another argument that could, however, lead one to support a rule such as a money base growth rule and yet still favour separate central banks. It might be argued that movements in the exchange rate between the New Zealand and Australian dollars automatically help to stabilise the New Zealand real economy, even if monetary policy is passive in both countries.

Suppose, for example, that a shock requires the price of some non-traded goods in New Zealand to fall relative to the price of some goods imported from, or exported to, Australia. Under a flexible exchange rate, the adjustment could be achieved, in part,³⁹ by a devaluation of the bilateral exchange rate, which would allow the price of goods traded by New Zealand with Australia to rise. Under a fixed exchange rate between New Zealand and Australia, the nominal price of the affected non-traded goods in New Zealand would have to fall. The nominal rigidities view of the real effects of monetary shocks would imply that the adjustment of prices for non-traded goods would be more difficult, and involve more real losses, than an exchange rate adjustment.

The argument that a flexible exchange rate is needed to ease the adjustment to terms of trade shocks may overstate the benefits of a flexible exchange rate for a number of

³⁸ Some of the supporting arguments for the position outlined in Chapter 2 are presented in the more technical appendix, Chapter 5.

³⁹ As we note below, the extent to which an exchange rate adjustment can substitute for domestic price movements may depend on the uniformity of the relative price changes. Macroeconomic models with 'representative' non-traded, exportable and import-competing goods often overstate the uniformity of relative price adjustments accompanying different shocks.

reasons. To begin with, nominal rigidities may not be the main source of real effects of monetary shocks. For example, the alternative banking model of the real effects of monetary shocks discussed in Chapter 5 suggests that the exchange rate movement may impose other temporary shocks on the economy, including changes in interest rates. If this model more accurately represents the way the economy works, it is no longer so obvious that the exchange rate adjustment would result in fewer adjustments and temporary reallocations of resources overall.

The second reason a flexible exchange rate may not help ease trade shocks is that the originating shock may be a required adjustment in the relative prices of some New Zealand non-traded goods to some goods traded with Australia. An exchange rate change produces an immediate change in the prices of all traded goods relative to all non-traded goods. These short-run relative price adjustments may be appropriate in some cases, but inappropriate in others.

Ultimately, the originating shock will require resources to be reallocated away from some firms or industries and toward other firms or industries in New Zealand. There are real costs of achieving such resource movements. Matters such as labour market flexibility may be far more important determinants of the costs incurred in achieving these reallocations than is the path of adjustment.

One can also question the extent to which the bilateral exchange rate between New Zealand and Australia would respond to a shock of the type we are considering.⁴⁰ The share of New Zealand goods in Australia's trade, and the share of Australian goods in New Zealand's trade, are not extremely large. In a floating exchange rate system, the value of each currency would be affected by many shocks arising in third countries.

Finally, it is doubtful that New Zealand terms of trade and other economic shocks are less closely correlated with shocks affecting the eastern Australian states than, for example, shocks affecting the West Australian economy. For example, the New Zealand economy has an industry structure more similar to the Tasmanian and Victorian economies than does the West Australian one. If a flexible exchange rate between West Australia and the eastern Australian states is not needed to help the two parts of Australia adjust to shocks, why should one be needed to help New Zealand adjust?

The final point raises the issue of whether there are other avenues of adjustment to shocks differentially affecting the Australian states that would not help with adjustment to shocks that differentially affect parts of Australia and New Zealand. Following Mundell (1961), migration flows have been considered an important avenue of adjustment. For example, the boom and bust cycles in Texas associated with dramatic swings in oil prices in the 1970s and 1980s were associated with considerable migration between Texas and the rest of the United States. These days, there is, however, substantial migration back and forth across the Tasman in response to changes in economic prospects in New Zealand and Australia. There may, for example, be just as much

⁴⁰ A referee has suggested that a flexible exchange rate between Australia and New Zealand might be more valuable for adjusting to foreign shocks that affect the two economies asymmetrically.

movement of people back and forth across the Tasman in response to economic shocks as there is between West Australia and the eastern Australian states.

A related argument is that fiscal transfers assist with the adjustment to regional economic shocks. These could include inter-governmental transfers, such as the payments made to Tasmania under the fiscal federalism arrangements in Australia. Like regional development funds in the EU, however, such transfers are based on formulas related to variables that change slowly, such as population. They do not vary much with the business cycle.

Perhaps more relevant are the so-called 'automatic stabilisers'. Unemployment benefits will rise in regions suffering from an adverse shock, while regions experiencing a favourable shock will tend to pay higher taxes. Capital markets would, however, permit similar adjustments in a monetary union. The New Zealand government could issue debt to pay unemployment benefits if the New Zealand economy is affected by an adverse shock, and then run a surplus when the local economy is experiencing a positive shock. If the shocks are not correlated in Australia and New Zealand, Australian governments would be issuing fewer bonds denominated in the joint currency at the same time as the New Zealand government is issuing more.

An integrated capital market would also allow individuals to borrow when their incomes are temporarily low and reduce their debt under more favourable circumstances. In fact, to the extent that shocks in the two countries are not correlated, a better integrated financial market would provide better insurance, or risk reduction, benefits to each country.

Grimes *et al* (2000) present evidence that a flexible exchange rate did not help the New Zealand economy adjust to shocks in the 1990s. Specifically, they show that fluctuations in the value of the New Zealand dollar during this period were more highly correlated with domestic housing prices than with New Zealand's terms of trade.

By contrast, fluctuations in the Australian dollar tended to offset shocks to Australia's terms of trade to a greater extent. Furthermore, Grimes *et al* show that the Australian and New Zealand terms of trade are highly correlated. As a result, exchange rate movements would have offset terms of trade shocks to a greater extent on average if New Zealand had been using the Australian dollar during the 1990s and the value of the Australian dollar had not thereby been affected.

Grimes *et al* also examine the time pattern of joint movements in the New Zealand terms of trade and real exchange rate. They argue that these patterns also suggest that New Zealand may have been better off using either the Australian dollar or the US dollar as their currency in the period 1986–1999. In particular, they claim that the volatility of joint movements in these two variables would not have been greater under either of the alternative currencies than they were with the actual historical values of the New Zealand dollar.

The quote from Sherwin (1999) (p 30 of Chapter 2) suggests one reason why fluctuations in the value of the New Zealand dollar may not have been a good hedge against terms of

trade shocks during this period. A focus on achieving the inflation target within a short time horizon may have led the Reserve Bank to rely excessively on exchange rate revaluations to reduce inflation early in the inflation targeting period. Similarly, Svensson (1997) cites *Briefing on the Reserve Bank of New Zealand*, issued in October 1996:

In recent years, the Bank's policy horizon has lengthened further into the future, driven partly by experience and partly by firmer empirical evidence on the impact of policy on inflation beyond the one year horizon.

Thus, the evidence presented by Grimes *et al* might have been different had the Reserve Bank been using a more passive money base or inflation targeting rule, rather than the actual monetary policy in force over this period.

Coleman (1999) questions the theoretical basis of the claim that a flexible exchange rate can help insulate an economy from shocks. He observes that, while some models imply that a flexible exchange rate can assist with adjustments to economic shocks, other models imply that floating exchange rates can exacerbate shocks. As we explain in Chapter 5, the forward premium is tied to the interest differential (this result is known as the 'covered interest arbitrage condition'). As a result, volatile interest rates will, in turn, yield a volatile forward premium. Thus, the forward foreign exchange market may be quite ineffective for reducing the volatility of real returns on anticipated future sales made in foreign currencies. This may explain why Grimes *et al* found that many firms do not hedge anticipated foreign currency receipts or disbursements.

Coleman also makes the point that, if the forward foreign exchange market is not effective for hedging exchange rate risks, exchange rate movements can impose losses similar to the losses resulting from inflation. As we noted in Chapter 2, a major cost of inflation is that it makes the value of money more uncertain. People are lead to make costly measurement errors just as they would if the instruments used to measure length or weight fluctuated at random. If foreign goods and services are a substantial part of an individual's consumption basket, poorly hedged exchange rate movements will similarly lead to unexpected changes in relative prices. Unanticipated changes in the purchasing power of money when measured in terms of foreign goods or services also reduce the effectiveness of money as a store of generalised purchasing power.

The covered interest arbitrage condition may explain another feature of the survey results obtained by Grimes *et al*. Of all the firms they surveyed, the ones that were most enthusiastic about a monetary union with Australia were firms that had borrowed funds from Australia. Grimes *et al* comment that:

Reduction of uncertainty in the value of debt repayments and debt servicing arising from a common currency is likely to be of particular benefit for these firms.

Many such firms could reduce the uncertainty of their future debt servicing costs, however, by selling New Zealand dollars forward for the required Australian dollars at a known price today. The response to this suggestion is likely to be that hedging the required payments in the forward market would eliminate the average interest differential that made borrowing in Australia attractive in the first place. The forward

premium for such coverage would equal the difference in interest rates on government bonds denominated in the two currencies. In the view of the firm, it would appear to be giving up the advantage of the lower Australian interest rates that encouraged it to sell bonds in the Australian capital market. A covered debt placement would only be attractive if the differential or risk premium for the firm's debt is lower in Australia than it would be in New Zealand. This could be the case, because the larger Australian capital market may provide greater opportunities for risk diversification. We suspect, however, that some firms that had borrowed from Australia, and were favourably disposed to monetary union, had speculated on future movements in interest and foreign exchange rates and had lost money in the process.

The argument that foreign exchange movements can be a source of shocks seems to rely mainly on the possibility that money supply shocks are destabilising. Such arguments may thus be less relevant in a regime in which the Reserve Bank uses a monetary base growth rule or an inflation forecast targeting rule as suggested in Chapter 2. With a less active monetary policy, a flexible exchange rate might do a better job of helping the economy adjust to shocks rather than being a source of shocks.

Another argument against abandoning a flexible exchange rate to enter a monetary union is that movements in the exchange rate now serve as a signal of the desirability of current government policy actions. When the New Zealand government announces it is considering some ill-advised change in policy direction, the immediate fall in the exchange rate may cause the government to re-think its position. It could be argued that movements in credit ratings (from agencies such as Standard and Poors) and interest rates for New Zealand government debt could serve a similar purpose under a monetary union. This currently happens with the Australian state governments. It is questionable, however, whether the feedback would be as swift and as evident to the general public as is a fall in the exchange rate.

3.3 Dollarisation or a currency board as long-run goals

As we noted in the Introduction, the only reasonable candidates for dollarisation or a currency board arrangement in New Zealand would be one of the three major currencies, namely the US dollar, the Japanese yen or the Euro. Grimes *et al* (2000) make a convincing case that of these three, only the US dollar would be suitable.

Under dollarisation, the Reserve Bank of New Zealand would be abolished and US dollars would be used as the circulating medium. Effectively, the US Federal Reserve would determine domestic monetary conditions. New Zealand private banks would make loans and accept deposits denominated in US dollars, and hold US dollars and dollar-denominated bonds as reserves. Situations in which one country uses the base money supplied by another are fairly common, and we have a better understanding of the potential costs and benefits of such systems than we do of supra-national currency unions.

Under a currency board arrangement, the Reserve Bank of New Zealand would be required to hold US dollar reserves as 100 percent backing for the domestic monetary

base. A domestic currency would still be issued and would circulate in New Zealand, but it would exchange for the US dollar at a fixed rate. As under a strict gold standard, anyone could demand to receive the specified quantity of US dollars in return for domestic currency or bank reserves. Eliminating the New Zealand dollar would involve forgoing seignorage revenue, and may appear to involve a greater sacrifice of New Zealand sovereignty than a currency union. A currency board may perhaps be slightly more acceptable on political grounds than dollarisation because a local currency would still circulate in New Zealand.

Dollarisation, or a currency board arrangement based on the US dollar, could be implemented more rapidly than a currency union. It would not require the agreement of the US government. New Zealand would become somewhat like Hawaii in economic terms. Unlike Hawaii, however, New Zealand would have no influence over the monetary policy chosen by the US Federal Reserve. In addition, migration between New Zealand and the United States is far more limited than migration between Hawaii and the mainland states. Hawaii can also receive more fiscal transfers from the rest of the United States than can New Zealand. Hence, New Zealand would have fewer options for adjusting to local shocks than Hawaii does. Finally, unless dollarisation were accompanied by a free trade agreement, New Zealand would face far greater barriers to trade with the United States than Hawaii does, even if the two countries shared a common currency.

Because the banks that operate in New Zealand do little business in the United States, the US Federal Reserve may not care about the liquidity of a New Zealand bank. If a severe shock affects the New Zealand economy, the US Federal Reserve may not provide liquidity to a New Zealand bank that is fundamentally solvent but temporarily illiquid.⁴¹

A currency board differs from the fixed exchange rates of the Bretton Woods era in a number of crucial respects.⁴² The commitment to parity between the New Zealand dollar and the US dollar under a currency board would be guaranteed by the 100 percent reserve backing of the domestic monetary base. Furthermore, New Zealand would forgo the option to run an independent monetary policy under a currency board arrangement. The Reserve Bank could not buy New Zealand government debt or engage in open market operations. These actions would break the fixed relationship between the domestic money base and the level of US dollar reserves held by the Reserve Bank.

The level of the money base under a currency board arrangement is determined by the demand for it as a transactions medium. Because economic growth expands demand for the money base, for example, New Zealand would run a balance of payments surplus to accumulate the necessary foreign currency assets. An implication of this is that New Zealand would surrender seignorage revenue to the issuer of the foreign currency used as the peg, unless the latter agreed to refund the amount. In a speech to the Auckland

⁴¹ Chapter 5 discusses the distinction between bank liquidity and bank solvency. This issue is also discussed in more detail later in this chapter.

⁴² Different types of exchange rate regimes, including the Bretton Woods regime, are discussed in more detail in Chapter 5.

Rotary Club on 22 May, 2000, the governor of the Reserve Bank noted that seignorage revenue in New Zealand currently amounted to about NZ\$130 million each year and is growing gradually. The loss of seignorage revenue would also occur with dollarisation. In a monetary union, however, New Zealand could negotiate to receive a proportionate share of seignorage revenue as has happened with the European monetary union.

The critical issue for New Zealand in considering the use of the US dollar as a currency is whether this would improve upon the best monetary arrangements that New Zealand could implement either on its own or in monetary union with Australia. Other considerations are also relevant, but their consequences could easily be dominated by the costs of inheriting the monetary policy that the US Federal Reserve operated in the 1970s and early 1980s, if this were to be repeated.

3.3.1 Potential benefits of dollarisation or a currency board

As with a monetary union, there may be savings in transactions costs associated with adopting the US dollar as the New Zealand currency. The Argentinian experience with a currency board suggests that the greatest benefit would involve almost complete elimination of the currency risk premium in capital markets resulting from unanticipated fluctuations in the exchange rate between the US and New Zealand dollars. Grimes *et al* claim that:

Combining with the United States would virtually wipe out any foreign exchange risk premium on our interest costs, leaving only a much smaller country credit spread.

This assessment relies on foreign lenders being confident that the currency board arrangement is permanent. In this respect, dollarisation may be preferable to a currency board. A currency board could be abandoned by allowing the local currency to float and by removing the constraint that the local central bank totally back its base money issue with US dollars. Dollarisation would be much more difficult to reverse because it would require that people in New Zealand cease using US dollars as a local currency. This may only be feasible if the United States were, again, suffering from high inflation or a monetary contraction such as the one that caused the Great Depression.⁴³ Grubel (1999) notes that Argentine government debt denominated in pesos still commands a slight premium relative to otherwise equivalent Argentine government debt that is denominated in US dollars. Because the market for the peso-denominated debt is likely to be more liquid, the premium must reflect a risk that the currency board could be abandoned, which would reduce the value of the peso-denominated debt.

Lally (2000) estimates that eliminating the currency risk premium relative to the US dollar may reduce real interest rates in New Zealand by about one percentage point. By contrast, Lally (2000) also estimates that there would be virtually no change in currency risk premium for New Zealand were it to enter a monetary union with Australia.

⁴³ During the Great Depression, many countries abandoned the gold standard which could be thought of as the 'currency board' of the time.

The savings in transactions costs associated with international trade are probably of lesser importance. Although the US dollar is the most widely used currency for international transactions, as the Euro stabilises in value, the currency market share of the US dollar is likely to fall. In addition, although a reasonable amount of New Zealand trade is currently denominated in US dollars, a substantial amount is also conducted in other currencies, including much of the trade with Australia, which is New Zealand's largest trading partner. New Zealand might gamble on Australia also adopting the US dollar as a currency some time in the future, in which case much more New Zealand trade would be conducted in US dollars. In the meantime, however, New Zealand trade with Australia would be seriously reduced when the US dollar appreciates relative to the Australian dollar, as happened for much of the latter part of the 1990s. Conversely, if Australia were ever to adopt the US dollar, the arguments for New Zealand also adopting the US dollar would become overwhelming.

The transactions costs advantages of New Zealand adopting the US dollar by itself would be greater if such a move were coupled with a free trade agreement between New Zealand and the United States. If there were also free migration between New Zealand and the United States, New Zealand would become much more like Hawaii in economic terms. The economic benefits to New Zealand of such a combined package of measures would be much more substantial than currency union alone. The transactions costs associated with using different currencies are small relative to the costs of existing tariff and non-tariff barriers to trade between the two economies.

Dollarising without reaching a free trade agreement with the United States may do little to attract new investment to New Zealand. This would be even more the case if Mexico dollarises. The NAFTA trade agreement between the United States, Mexico and Canada has stimulated trade within North America and attracted foreign investment to Mexico from firms wishing to supply the large United States market. It would be very difficult for New Zealand to compete with Mexico as a location for manufacturing firms wishing to serve the North American market. Even if New Zealand used the US dollar while Mexico and Canada did not, an Australian, Japanese or European firm wishing to sell into the United States market most likely would find Mexico, or even Canada, a more attractive location than New Zealand.

It might be thought that either dollarisation or a currency board arrangement would effectively control New Zealand inflation. As we note in a discussion of the so-called 'law of one price' in Chapter 5, a fixed parity between the New Zealand and the US dollar would tie the prices of traded goods in New Zealand to their United States values. When discussing 'purchasing power parity' in Chapter 5, however, we also note that use of a common currency need not produce identical inflation rates. Changes in the relative price of non-traded to traded goods in New Zealand or the United States would require a deviation in the two inflation rates. For example, the different states of Australia or the United States, or even different cities in New Zealand, do not have the same inflation rates. Similarly, Hong Kong has experienced a large inflation gap with the United States since adopting the currency board arrangement. The higher growth in productivity in Hong Kong has raised the price of non-traded relative to traded goods and services.

Similarly, Ireland has experienced a higher inflation rate in recent years than have other countries in the European Monetary Union.

3.3.2 *Potential costs of dollarisation or a currency board*

A potential cost of dollarisation or a currency board, as with a monetary union, is the forgone benefits from being able to operate a separate domestic monetary policy. This is not a problem if domestic monetary policy has been poor. Indeed, many of the countries choosing to dollarise or implement a currency board, or thinking of doing so, have had weak domestic monetary policies. As we noted in the Introduction, however, many people have a high regard for the current institutional arrangement for monetary policy in New Zealand. The idea of inflation targeting has been adopted by many other countries since it was first implemented in New Zealand.

Dollarisation or a currency board based on the US dollar would also preclude monetary union with Australia, unless Australia also decided to adopt the US dollar as its currency. Although Lally (2000) shows that the capital market benefits of adopting the US dollar as the New Zealand currency would exceed the capital market benefits of a monetary union with Australia, the net trade benefits of a monetary union would probably be greater. Australia is New Zealand's largest trading partner, and there is scope for further integrating the two economies. Grimes *et al* (2000) present evidence that the exchange rate barrier may be inhibiting small firms in New Zealand from exporting to Australia, while the converse may also be true. Monetary union with Australia might thus increase the competitiveness of both economies, providing greater incentives to efficiency and benefits to consumers in both countries.

A monetary union with Australia might also provide more avenues for other types of adjustments to shocks. For example, there is more migration between New Zealand and Australia than between New Zealand and the United States. Thus, if Australia and New Zealand were using a common currency, shocks that affect equilibrium relative wages between the two countries could be accommodated by migration between them in addition to changes in nominal wage rates. If New Zealand is using the US dollar as a currency, however, shocks that affect the relative wages between New Zealand and the United States could only be accommodated by nominal wage movements.

In addition, movements in the exchange rate between the US dollar and the Australian dollar would bear little relation to changes in New Zealand's competitiveness. In particular, they will bear little relationship to the competitiveness of New Zealand firms relative to their Australian counterparts. If minimum or award wages in New Zealand are binding,⁴⁴ a devaluation of the Australian dollar relative to the US dollar would raise New Zealand unemployment unless New Zealand wages are reduced in nominal terms. Unfortunately, the New Zealand government may not always choose to reduce minimum wages or labour market rigidities in preference to allowing unemployment to rise.

⁴⁴ Chapter 5 discusses the effect of rigid nominal minimum or award wages in detail.

There is also a greater chance that Australia and New Zealand could agree on a common fiscal, as well as monetary, policy framework. In particular, monetary union with Australia would probably allow New Zealand to retain an inflation targeting regime because both countries now have such a regime. A monetary union may also enhance other desirable policy adjustments in both countries, such as moves to harmonise product, health, and safety standards. Grimes *et al* (2000) suggest that the correlation of terms of trade shocks is higher between Australia and New Zealand than between the United States and New Zealand, and this may be a reason for preferring the monetary union option.

The fact that both Australia and New Zealand share major banks and other financial firms may also facilitate the development of institutions to cope with temporary liquidity problems. The possibility of bank runs can create substantial problems for a currency board arrangement. While the New Zealand money base would be 100 percent backed by US dollar assets under the suggested currency board arrangement, the supply of inside money would not be. Commercial banks do not have to hold 100 percent reserves against their deposit liabilities, and it would impose substantial costs to require them to do so.

As we note in Chapter 5, there may be a justifiable role for the central bank as a lender of last resort in a bank run because only the central bank can accommodate the increased demand for base money that is characteristic of a bank run. Bank runs result from a type of externality. The situation is analogous to shouting 'fire' in a crowded theatre, which is likely to prompt a scramble for the doors. A loss of confidence in one bank can similarly lead to a stampede to liquidate deposits at many other banks. The private banks could be solvent, but temporarily illiquid. While the banks may have sufficient assets to cover their liabilities, they may have to sell assets at a discount if they are forced to liquidate them in a hurry.

The fact that the private banks hold only a small proportion of their assets as liquid reserves or Treasury securities normally does not create problems. Only a small percentage of deposits are withdrawn, or transferred to another bank, on any one day. A temporary increase in withdrawals or transfers out of any one bank does not create a problem, because the banks lend each other liquid assets.

If there is a pervasive loss in confidence in the ability of banks to provide liquid assets on demand, bank customers will rush to liquidate deposits. In effect, the demand for outside, or base money, expands relative to the demand for inside money. Because banks normally economise on the use of base money (so reserves of base money are much less than total bank liabilities) the overall demand for base money will rise. Banks as a whole will not have sufficient reserves to meet the increased demand for withdrawals and the fears of illiquidity that prompted the bank run will be realised.

The central bank can stem the run by increasing the supply of base money to match the increased demand. The central bank can extend loans of base money to the private banks, taking the illiquid assets of the banks as collateral. An increase in the reserves held by illiquid banks allows them to meet withdrawals without needing to liquidate long-term

assets. Once depositors discover they can withdraw base money on demand, the panic is likely to subside. The demand for inside money will recover, allowing the banks to redeem their loans from the central bank.

A central bank in a currency board system that is also providing lender of last resort services may become caught between two commitments. On the one hand, the bank is committed to maintaining the money base equal to its holdings of foreign denominated assets. On the other hand, the central bank also is committed to expanding the money base to accommodate a run on the banking system.

The central bank is critical to stopping a bank run because only the central bank can increase the supply of base money to match the temporary increase in demand. Under a currency board system, however, the central bank is committed to keeping the base money supply fully backed by reserves of foreign exchange.

In theory, a private bank that is experiencing temporary liquidity problems but is fundamentally solvent ought to be able to borrow on the international capital market. The private bank could then convert those foreign assets into reserves of domestic base money by depositing them with the central bank. The private bank could thus expand the supply of base money to match the temporary increase in demand for it.

Alternatively, if the private banks cannot borrow on the international capital markets on their own account the central bank, or the Treasury, ought to be able to borrow foreign exchange on their behalf. Again, this would temporarily allow the central bank to expand the domestic monetary base without violating the commitment to back the base 100 percent with foreign currency assets.

Foreign lenders may fear, however, that the currency board arrangement could be abandoned. They may suspect that the central bank or the Treasury is mistaken in its assessment of the nature of the crisis, or that the government may refuse to raise taxes to pay off the foreign debt. The central bank or the Treasury may not be able to borrow internationally at a reasonable interest rate. The only remaining alternatives are to abandon the currency rule or the lender of last resort function. Allowing a solvent bank to collapse may provoke runs on other banks and cause severe disruption to the domestic economy. Abandoning the currency rule is likely to emerge as the least unsatisfactory alternative. Such an action would, of course, validate the expectations of the potential foreign lenders. Grubel (1999) observes:

In Argentina, speculators with doubts about the permanence of the system in 1998 withdrew funds and forced large reductions in the domestic money supply⁴⁵ on the country.⁴⁶ In the end, however, the system was not changed and the crisis has ended.

The final problem with adopting the US dollar as New Zealand's currency is that one can raise reasonable doubts about the quality of US monetary institutions. In particular, it is

⁴⁵ The money supply referred to is measured as the base held by the non-bank public plus inside money balances. A shift from the base to inside money reduces this total because inside money balances are less than 100 percent backed by reserves of base money. Again the reader is referred to Chapter 5 for a more detailed discussion of the distinction between inside and outside money.

⁴⁶ Although Grubel does not say so, a recession accompanied the money supply fall.

questionable whether the US inflation rate will always be as low as New Zealand would like.

There are some grounds for optimism on this score. The US Federal Reserve ran a successful monetary policy in the 1990s, while the United States had a better inflation record than Australia or New Zealand in earlier decades. Furthermore, it is much more difficult to implement fundamental institutional changes in the United States than it is in New Zealand. Even if the US Federal Reserve is not a perfect institution, one can be very confident in the stability of the laws governing its behaviour. By contrast, while New Zealand found it relatively easy to adopt an inflation targeting regime in 1989, a future New Zealand government may also find it easy to re-institute more activist and inflationary policies.

There are also reasons for believing that New Zealand and Australia might be able to implement a better monetary policy than the US Federal Reserve. Many other countries, including small open economies such as Switzerland, have in the past produced better monetary policies than the United States. Furthermore, one could argue that Australia and New Zealand now have better policies. Australia has followed the lead of New Zealand and officially adopted an inflation targeting regime. By contrast, the US Federal Reserve is not constrained by law to pursue only an inflation target. If New Zealand were to join with Australia in forming a joint central bank constrained to pursue an inflation target, such an institution may be difficult to abolish, thus effectively locking in the current regime.

3.4 Competitive base money supply

An alternative to reducing the number of currencies in Australasia would be to allow, if not encourage, competition in supplying base money. This is, in a sense, an opposite policy direction to forming an ANZAC dollar. The government could allow private financial institutions in New Zealand to issue their own currencies. The government could also facilitate the use of the Australian or US dollars, or any other foreign currencies, for transactions purposes within New Zealand by accepting such currencies as payment for tax liabilities.

Consistent with the competitive base money supply model, one could argue that the exchange rate between the New Zealand and Australian dollars provides a type of 'competitive discipline' on the two central banks. This raises the issue of whether a move to an even more competitive base money supply system might be more desirable.

As the historical examples discussed by Bordo and Jonung (2000) illustrate, competitive supply of base or outside money within a given geographical area certainly is 'feasible'. In all of the historical cases they cited, competition was between money standards based on different commodities, usually silver and gold.

The analysis of Kareken and Wallace (1977) demonstrates that there is a good reason why competing base monies used in the same geographical area have, in practice, always been commodity monies. If there are two competing fiat monies available for use in the same economy, the exchange rate between the monies is indeterminate. The basic reason

is that the demand for any monetary asset is completely unaffected by a currency reform. If ten shillings are redefined as one dollar, all nominal variables also change by a factor of ten, and no relative prices or other real quantities are affected. The same old notes and coins can continue to circulate with people simply attaching a new meaning to them.

Similarly, suppose we have two private banks issuing competing fiat base monies. One bank issues 'red' money while the other issues 'blue' money. The two monies could exchange one-for-one, in which case prices also would be identical when expressed in terms of either currency. Alternatively, units of either currency could be redefined through a currency reform. Suppose, for example, that a reform results in ten red notes exchanging for one blue note. Prices would then be ten times greater when expressed in terms of red notes rather than blue notes. Such a currency reform would change nothing real so far as users of the currencies are concerned and would thus have no effect on the economy. The exchange rate between the two fiat monies, and the ratios of the nominal prices of a good or service expressed in the two monies, could be any value.

We conclude that competitive supply of base money is feasible only if each of the base monies involved is either a commodity money, or else mimics a currency board arrangement by being a locally issued version of a foreign currency.⁴⁷ Each issuing firm would need to maintain a reserve of either the commodity or the foreign currency to support the promise of convertibility for its currency. The value of the currency, measured in terms of the goods and services it could buy, could not change arbitrarily but would instead depend on the amount of commodity or foreign currency that the issuer possessed to 'back' the currency and the rate of exchange between that 'backing asset' and goods and services in general.⁴⁸

Locally issued circulating notes and coins in a competitive money supply system would almost certainly be commodity-based. An issuer of a local currency that is based on a foreign currency would have to compete with that foreign currency for financing transactions in the domestic economy. The foreign currency would have a strong advantage in that competition because it would be more widely accepted internationally.⁴⁹ The locally issued currency may also fluctuate in value relative to the equivalent foreign currency if consumers believe that there is any chance that the local issuer could unilaterally alter the conversion rate. Most consumers would thus prefer

⁴⁷ As we argue below and in Chapter 5, the competitive supply of inside money, or free banking, is another matter entirely.

⁴⁸ Because New Zealand is only a small part of the world economy, changes in the demand for a commodity base money in New Zealand would have little effect on the New Zealand inflation rate. Suppose, for example, that a private issuer of base money in New Zealand used gold as the outside asset. An expansion of internet trading in New Zealand could allow the economy to finance the same volume of transactions with less base money. One might think that the fall in the demand for the money base would increase the New Zealand inflation rate. In practice, however, the relative price of gold to, let us say, lamb, would be fixed in world markets and the fall in demand for base money in New Zealand would instead result in an outflow of gold from New Zealand and a contraction of the base money supply to match the newly reduced demand.

⁴⁹ A domestic money based on a foreign currency that is issued by a government-owned monopoly central bank can be declared as the only legal tender for settlement purposes between private banks and for paying taxes. This creates a demand for the locally issued currency.

simply to hold the foreign currency directly. Private banks in a competitive money system may, however, accept deposits and offer loans denominated in a foreign currency. Such banks would hold reserves of the foreign currency and highly liquid government bonds denominated in the foreign currency and could operate in the same way as private banks in the current monetary system. Demand deposits and bank loans could also be denominated in terms of any locally issued commodity money.

While competitive supply of base money is feasible, it is debateable whether it is desirable, or preferable to monopoly government supply under the best feasible rule. If one or more foreign currencies circulate as the local money base, it would seem that little has been gained relative to an official currency board arrangement. In fact, coordinating on using just one foreign currency may lower transactions costs.

There would also seem to be little to be gained by switching to commodity base monies. A cost of operating a commodity money is that the issuing institution needs to warehouse a quantity of the commodity in order to make credible its commitment to exchange base money for the commodity on demand. These stores of the commodity are costly to maintain and, unlike the assets held by the central bank under a fiat money base, do not bear interest.

The public also knows that under a fiat money base system the government can always issue bonds to the central bank to allow it to expand the money base. Under a fiat money system, therefore, base money can be readily supplied to a bank suffering temporary liquidity problems. By contrast, gold or other similar commodities cannot be manufactured on demand and, even though they can be purchased on world commodity markets, the supply can be increased only gradually.⁵⁰ In consequence, a bank issuing a commodity base money would need to hold a substantial inventory of the commodity to instill confidence in its commitment to exchange the commodity for its money at par. Even then, the system may be plagued by repeated losses of confidence and bank runs. The real losses associated with just one bank run could easily exceed many years of efficiency gains associated with a competitive supply of base money.

A commodity base money system also does not guarantee price stability. In fact, the price of all other goods or services in terms of the commodity money would fluctuate with variations in the supply of, or non-monetary demand for, the commodity. It is not obvious that these fluctuations would be less than would occur, for example, in a fiat base money system with a fixed supply of the monetary base.

A more fundamental question is whether the supply of base money may have some characteristics of a public good. For example, monetary policy, or supply of base money,

⁵⁰ A referee suggested that a bank run might be alleviated in a commodity money system by lending Treasury securities to private banks with bank assets held as collateral. If Treasury securities are part of the money base, however, the system is not truly a commodity money base system. The next section discusses briefly the properties of a system with Treasury securities as the outside money asset. A bank issuing outside money based on gold or other commodities with an associated futures market might also be able to offer future contracts in exchange for its liabilities. It is an open question whether this might be acceptable to depositors.

shares a number of characteristics with law enforcement. Like monetary policy, law enforcement suffers from a time inconsistency problem. Once deterrence has failed and someone has committed an offence, there would seem to be little point in punishing that particular offender. If the offender is not punished, however, future potential offenders will not be deterred. Similarly, once monetary policy has deviated from the inflation target, it may seem that the best response is to forget about the previous inflation target and simply set a new target for the future. Continually revising the inflation target will, however, result in a loss of credibility. Another similarity between law enforcement and monetary policy is that in both cases poor policy can impose substantial costs, while good policy seems invisible.

The most interesting parallel for our current purposes, however, is that law enforcement could be supplied competitively. Indeed, just as we have banks supplying services of added value to their customers, so also private security firms provide additional protective services to businesses and others. Allowing such additional services to be supplied on a competitive basis is also likely to enhance overall efficiency. In the case of law enforcement, however, we are better off having a monopoly police service be the ultimate law enforcers. The feedbacks from poor policy implemented by private agents may be too long, too variable and too weak to make competitive supply effective. The competition between enforcement agencies may itself impose other costs. For example, enforcement groups may fight over territories of control, while people may be encouraged to migrate solely to get better protection.

The feedbacks from poor monetary policy in a competitive system may also be long, variable and weak. The difficulties of monitoring central bank policy apply also to private suppliers of a base currency. A private bank may be able to expand the supply of its currency for some time before people begin to doubt the bank's ability to exchange commodities for the outstanding stock of liabilities. When doubts do arise, the loss of confidence in one bank may spill over to other banks and provoke a liquidity crisis, even if all other banks have been acting prudently.

Inside money that is supplied by a competitive banking sector, and tied to a money base supplied by the government, is analogous to private law enforcement services. Competitive supply of inside money, or 'free banking', could even extend to allowing the competitive supply of bank notes and coins or other transactions media. The money base may then be restricted to the reserves held by financial intermediaries at the central bank.

The costs of competition in the supply of ultimate law enforcement services also have a parallel in the competitive supply of base money. Allowing multiple currencies to circulate with a variable value among them raises transactions and information costs. Every time one went to the supermarket, the relative value of red and blue bank notes (issued by different firms) would need to be checked. These costs might be falling in the modern era of computers and telecommunications, but even so the costs would be non-trivial. A world of multiple currencies with fluctuating relative values would also impose some of the costs of inflation, particularly the increased risk associated with holding money.

It might be thought that the high transactions costs associated with multiple base monies could be eliminated by requiring the currencies to exchange at a fixed parity. If the relative price of the underlying commodities varies, however, the result is called Gresham's Law: bad money drives out good.⁵¹ The historical examples discussed by Bordo and Jonung (2000) demonstrate this process in operation. The bad money is backed by the commodity that is declining in value. Because the currencies continue to exchange at a fixed artificial rate, it becomes optimal to spend bad notes or coins whenever one receives them. The good notes or coins are exchanged for the appreciating underlying commodity whenever they are received. Gradually, almost all transactions are conducted with the bad notes and the good ones disappear from circulation. A system with competing commodity monies and a fixed rate of exchange between them is inherently unstable.⁵²

Another useful analogy can be drawn between base money supply and the choice of weights and measures. In the latter case, too, we could have competing standards. There even might be some benefit in allowing measuring standards to compete. None of the existing systems of units is perfect, and competition among standards might help determine which system is best. The costs involved in having two or more standards operating simultaneously are, however, non-trivial. One need only look at the problems many English-speaking countries have had converting to metric units.

The general price level, or the value of base money, can similarly be regarded as a measurement standard. Strictly speaking, this applies to the 'unit of account' function of money rather than its transactions role. Nevertheless, as argued above, it is costly to have a unit of account that differs from the transactions asset. One reason that inflation is so damaging is that changes in the measuring standard lead to numerous calculation errors. In so far as outside money is a measurement standard, there may be substantial cost advantages associated with having just one standard of value.

A more important issue than competitive supply of base money is getting the best possible banking system. Just as competition provides improved services in other areas of the economy, free competition among banks and other financial institutions in supplying inside money is likely to achieve the best results. Such competition could be expected to provide substantial benefits to consumers including better transactions assets, more convenient services and so on.

3.4.1 The future role of money

Cowen (1991) discusses a scenario that may become more feasible with the expansion of electronic payments systems. The economy could evolve toward a system "in which the demand for currency disappears altogether". All transactions by consumers and firms would be financed by competitively supplied inside money.

⁵¹ For an example, see the discussion in footnote 16 in Chapter 2 of the guinea versus pounds sterling.

⁵² This also was essentially the same problem that ultimately caused the breakdown of the Bretton Woods system of fixed exchange rates accompanied by unconstrained issue of domestic fiat base money.

One could ask whether a system where only inside money is used for transactions purposes is feasible or desirable. If the economy evolved toward a situation where the demand for not just currency but total base money disappeared, the price level would become highly unstable and ultimately indeterminate as the evolution proceeded. As we argue in Chapter 2 and Chapter 5, the price level is determined in general equilibrium to equate the demand for base money to the available supply. If the demand for base money falls to zero in real terms, the price level will rise without bound to make the available supply of base money match the falling demand.

The money base is held not only to finance transactions by consumers and firms, however, but also by commercial banks as reserves. Inside money is effectively a claim to bank reserves of outside money. As long as there is a determinate demand for outside money as reserves, the price level would also be determined.

The same point can be made in a slightly different way. It might be thought that an economy where only competitively issued inside money is used to finance transactions is equivalent to an economy with competitively supplied outside fiat base money. If so, it would suffer from the problem of an indeterminate price level that would plague such an economy as discussed above. If the issuers of inside money have to guarantee convertibility of their liabilities into an outside asset, however, the supply of their liabilities is limited, as is the value of those liabilities in terms of goods or services.

Cowen (1991) raises the possibility that, along with inside money displacing currency for transactions purposes, Treasury securities could displace central bank deposits as settlement balances. Because the Reserve Bank of New Zealand pays interest on reserves at 65 percent of going market rates, the "Treasury securities would be equally liquid as cash at the wholesale level and would offer superior pecuniary returns". This might suggest that the banks would prefer to use Treasury securities as liquid assets.

The frequency with which interest is paid is a potential offsetting factor to the higher yield on Treasury securities. In general, assets with more frequent interest payments (daily as opposed to quarterly, monthly or even weekly) tend to be more liquid.⁵³ If interest is paid infrequently, there is an incentive to hoard an asset as the interest payment date falls due. This incentive reduces the usefulness of the asset as a transactions medium, that is, its liquidity. Thus, a higher explicit yield on Treasury securities can be offset by a more frequent payment of interest on settlement balances. In addition, changes in market interest rates can lead to substantial fluctuations in the prices of longer-term Treasury securities. Longer-term Treasury securities are thus more risky

⁵³ In this context the zero interest paid on cash can be thought of as a limiting case because if there is no explicit interest payment there is also no need of a 'date of record' to determine who will receive the coupon income. An asset that does not have an explicit interest yield thus is very liquid. A zero coupon bond also does not have an explicit interest payment date even though it does have a positive yield. In effect, interest on a zero coupon bond is accrued continuously through capital gains as the maturity date approaches. Nevertheless, in order to maximise interest income, it is optimal to spend cash in preference to any interest-bearing asset whenever it is possible to do so. Thus, cash is more liquid than even a zero coupon bond.

than shorter-term securities, and the higher risk reduces their liquidity.⁵⁴ In this context, one could think of deposits of commercial banks at the central bank, which accrue interest daily, as equivalent in terms of default risk to Treasury securities but with a term to maturity of one day.

Suppose we assume for the sake or argument, however, that Treasury securities do displace central bank deposits as settlement balances. As we argue in Chapter 2 and Chapter 5, if Treasury securities and settlement cash yielded identical liquidity services, they would, in equilibrium, pay identical pecuniary returns. Thus, if the implicit 'liquidity return' on a particular maturity Treasury security rises because it becomes more useful as a transactions asset, the explicit interest yield on that security would fall to compensate. Securities of other maturities, which would then have a higher explicit yield, would become less liquid. As a result of their higher explicit yield, they would be hoarded in preference to the lower yielding more liquid maturity. If the demand for settlement balances held on deposit at the Reserve Bank disappeared, the lowest yielding security would effectively become 'outside money'. The supply of that security relative to the demand for it would determine the price level. The central bank could also buy or sell quantities of the most liquid security to influence the supply available to the banks and thus the price level.

We conclude that continuing evolution of a competitive inside money system does not pose any threat to the stability of the economy in general, or the stability of average nominal prices in particular. Technological innovations may continue to reduce the demand for outside money by making inside money of various sorts more convenient. On the other hand, continuing growth in the overall level of transactions will expand the demand for all types of monetary assets, including outside money. The balance between these offsetting forces could result in either increasing or decreasing prices if the supply of outside money, and the characteristics of that asset including its explicit interest yield, were kept fixed. There is no reason, however, to expect these changes in demand for outside money to be anything other than smooth and gradual and thus no reason to expect a fixed supply of base money to result in anything other than mild and smoothly fluctuating variations in the rate of inflation or deflation of average nominal prices.

⁵⁴ See also the discussion of the interest yield curve in Chapter 5.

4

CONCLUSION

If imitation by other countries is a reliable guide, the inflation targeting regime introduced by New Zealand in 1989 is a good framework for monetary policy. It is now widely accepted that monetary policy ought to focus on achieving low and stable inflation rates. If monetary growth rates are set too high, no other policy can eliminate the resulting inflation.

The recent review of monetary policy could be an early warning that domestic interests not happy with the Reserve Bank's focus on low inflation may eventually overturn the current policy. There are undoubtedly some who would like to force the Reserve Bank to once again 'fine tune' monetary policy in an attempt to control output and employment.

It is extremely difficult to use monetary policy to alter the growth of output or employment without doing more harm than good. While a monetary expansion may raise aggregate output or employment in the short term, it is by no means clear that such artificial stimulation of the economy is efficient. Even if aggregate output is depressed by an adverse weather or other supply shock, a monetary expansion simply adds another temporary shock that encourages resources to be used in ways that are inconsistent with the long-run underlying economic fundamentals. In the longer term, the monetary expansion ceases to stimulate output and simply raises the inflation rate.

In a regime of high and variable inflation, people begin to associate price movements with monetary noise. Prices cease to provide reliable signals of how resources can be used best to satisfy the demands of consumers and efficiency declines. Financial contracts also become much more risky, making individuals and firms reluctant to save and invest or to make future plans. These effects ultimately reduce economic growth and prosperity.

As the final report of the Finance and Expenditure Committee of the New Zealand parliament stated in 1989, "Monetary policy at the end of the day can only hope to achieve one objective, that is, price stability". New Zealand, and subsequently many other countries, removed output, employment and other targets from the list of goals for a central bank. The Reserve Bank was given operational independence and an explicit inflation target.

A low and stable inflation rate is the only reasonable ultimate goal for a central bank. That is not to say, however, that the current inflation targeting regime in New Zealand is beyond reproach. Strict inflation targeting may have encouraged excessive monetary activism. By forcing a revaluation of the exchange rate through tighter monetary policy, the Reserve Bank can alter the prices of traded goods, and hence bring inflation back within the target range in a relatively short timeframe. As a consequence, however, large costs are imposed on the traded goods and interest-sensitive sectors of the economy. A

change to a more passive monetary policy regime by the Reserve Bank could help solve this problem.

We suggested a number of ways that the projected or expected inflation rate could be targeted in place of the actual rate achieved over a short period. The choice of a growth rate for the monetary base as an intermediate target may provide another compromise between avoiding activism and ensuring that the inflation rate cannot get unacceptably large. The arguments used to dismiss the money base growth rule in 1989 ought to be reviewed. In particular, we suggested that a hybrid rule combining inflation targeting with money base growth targeting might prove to be superior to either rule in isolation.

Perhaps the strongest argument for supporting a monetary union with Australia is that such a monetary union might encourage the adoption of a passive monetary policy regime. Because both central banks are currently committed to a low inflation goal, it is likely that both the Australian and New Zealand governments could make targeting inflation the ultimate objective for a joint central bank. In addition, a passive regime aimed at achieving that objective would appear to be in New Zealand's interest. If a joint central bank were permitted to pursue an activist policy, it would be likely to further the short-run goals of some Australian interests, perhaps at the expense of people in New Zealand. Enshrining a passive monetary policy regime in the objectives of a joint Australian and New Zealand central bank might also prove a more effective barrier to future meddling with monetary policy on either side of the Tasman.

If a joint central bank with a focus on targeting inflation could be established, there might be other benefits for New Zealand. There is evidence that exchange rate fluctuations may have hindered further integration of the New Zealand and Australian economies. In particular, small firms in both countries may have found the additional risks associated with unanticipated exchange rate movements too burdensome to establish trading operations in the other country. Small New Zealand firms may gain economies of scale from greater access to the Australian market. In addition, small Australian firms may provide the greatest potential source of increased competition for firms in New Zealand. Greater competition would most likely improve outcomes for New Zealand consumers and workers.

Several other factors suggest that the two countries could be suitable as monetary union partners. There is a reasonably high positive correlation between the shocks affecting the New Zealand and Australian economies. Adjustment to shocks is further facilitated by free migration between the countries. The past history of agreements between the two governments suggests that they may also be able to agree on a suitable joint fiscal policy framework.

On the other hand, proposed New Zealand policies toward labour markets could be a reason to avoid monetary union, if a consequence of such would be exposure of the New Zealand economy to more shocks. The granting of privileges to trade unions, legislation of wages or features of employment contracts, provision of unemployment benefits that discourage efficient job searches, or the imposition of barriers to hiring and firing, all increase frictions in labour markets and raise the costs of adjusting to economic shocks.

We argued that monetary union with Australia is unlikely to occur in the near future. The European Central Bank is the first supra-national monetary union, so it would be wise to wait to see how it works before emulating it in Australia and New Zealand. In the meantime, Australia and New Zealand could keep the monetary union option open by continuing to use a similar monetary policy rule. In particular, a return to more activist monetary policy in New Zealand may have the additional cost of reducing the chances of a future monetary union with Australia should the European experience prove beneficial.

The possibility of a future monetary union with Australia provides another reason for New Zealand to retain labour market policies that promote flexibility. Open migration between Australia and New Zealand would also need to be further encouraged, aided by mutual recognition of more professional and technical qualifications. Finally, each country would need to ensure that it has stable and moderate fiscal policies in the period prior to a monetary union.

Following the lead of Argentina and establishing a currency board based on the US dollar is another monetary arrangement that has been suggested for New Zealand. Lower interest rates, perhaps by as much as 1 percent annually for the riskless real rate, are a major potential benefit. The largest potential cost would be that New Zealand would have to accept the monetary policy of the US Federal Reserve Board. While the current monetary arrangements in New Zealand may not be beyond criticism, they are better than the institutional framework under which the US Federal Reserve currently operates.

While there is considerable prior experience with currency boards (including in New Zealand and Australia in colonial times), these have usually been in a situation in which currencies are based on a gold or silver standard. It would be worth watching the experience of Argentina with a currency board based on a fiat money supply before choosing such an arrangement for New Zealand.

The practical strategy for New Zealand to follow in the short term is to improve its fiscal and labour market policies, which ought to be done in any case, and watch developments elsewhere. New Zealand could also explore the attitudes of potential partner countries to either monetary union or to a currency board arrangement. The reform proposals canvassed in this report all require more research. It would be wise to refrain from hasty decision making until more information has been collected on the behaviour of the current inflation targeting regime and more research has been conducted into the possible merits of proposed alternatives.

APPENDIX: MONETARY POLICY AND THE ECONOMY

In Chapter 2, we examined the current inflation targeting approach to monetary policy used in New Zealand. We suggested some modifications to operating procedures that could be implemented within the existing monetary policy framework. In Chapter 3, more radical changes to the current monetary arrangements in New Zealand were examined. As background for the discussion in both those chapters, several economic theories about how monetary policy affects the economy are examined in this appendix. We focus on what might be usefully accomplished through good monetary policy, and what harm may follow from inappropriate monetary policies.

The discussion in this appendix is more technical than the remainder of the report. In particular, because we are interested in hypothesising about how the economy might behave under different institutional arrangements, the discussion is, by necessity, theoretical and abstract.

5.1 What can the Reserve Bank control?

As long as individuals or private firms continue to accept a central bank's liabilities as a means of payment,⁵⁵ the bank can always determine both its total assets or liabilities and the composition of its assets. It can, for example, buy or sell government bonds in open market operations, or buy or sell foreign exchange in the foreign exchange market. When a central bank buys a government bond as part of an open market operation, or obtains foreign exchange while intervening in the foreign exchange market, it offers its own liabilities in exchange. The bank thus simultaneously raises its assets and its liabilities. The central bank can decrease its assets and liabilities by selling assets to the private sector and accepting its own liabilities as payment.

While the central bank has complete control over its assets and liabilities, if it so desires, it can also choose to relinquish such control in order to peg the price of some other asset. In that case, the monetary base becomes a function of whatever factors affect the net demand for the asset of which the price is being pegged. To make the commitment to the price peg credible, the central bank will need to hold reserves of the asset of which the price is being pegged.

⁵⁵ Even under the most extreme hyperinflations, central banks have been able to buy assets by offering their own liabilities in exchange. A universally acceptable monetary asset is so useful a device that individuals continue to use it even when the cost of doing so, measured in terms of the inflation tax, is extraordinarily high.

For example, to fix the rate of exchange between its own liabilities and foreign money, the central bank could stand willing to buy or sell whatever foreign exchange is needed to equilibrate the foreign exchange market at the chosen exchange rate. If the central bank attempts to maintain an excessive number of local currency units exchanging for foreign currency (that is, to maintain an under-valued exchange rate) it will need to buy foreign exchange and accumulate reserves, thereby expanding the domestic monetary base. Conversely, if the central bank attempts to limit the number of local currency units exchanging for foreign currency (that is, maintain an over-valued exchange rate), it will need to sell foreign exchange and to buy back its own liabilities. The central bank could, in this case, run out of foreign exchange reserves, in which case it would need to allow the exchange rate to devalue.

Similarly, the central bank can choose to fix the rate of return on a domestic government bond by standing ready to buy or sell whatever quantity of the bond the private sector as a whole wishes to sell or buy (respectively) at the chosen interest rate. Again, the monetary base becomes an endogenous variable rather than something that the central bank chooses directly. If the central bank is attempting to maintain an interest rate above the market equilibrium rate, it will need to sell government bonds and drive down their price. In order to facilitate such action, the central bank will need to hold government bonds in its asset portfolio.

Another type of monetary regime involves the central bank pegging the price of a commodity, such as gold or silver, or even a basket of commodities. A commodity-based monetary regime can be made automatic if the central bank commits to exchanging the specified commodity for its base money liabilities at a fixed rate on demand. Anyone with a central bank note can demand the specified quantity of gold, silver or other commodity simply by presenting the note to a branch of the central bank. In this case, too, the central bank would need to maintain a store of the commodity to make credible its commitment to a fixed price of the commodity in terms of base money.

As an accounting matter, the central bank's total assets and liabilities must always be equal. The central bank's liabilities are the notes held either by the public or as 'vault cash' by the private banks, or the balances held by the Treasury or private banks in their accounts at the central bank. While the central bank can control the total liabilities, the private sector determines the allocation of those liabilities to notes or reserves. The central bank can influence this decision, however, by altering the interest rate it pays on reserves.

The central bank also earns income on any interest-bearing domestic or foreign assets that it holds, and it often pays interest on accounts held by private banks. It also incurs operating expenses and may incur capital gains or losses on its assets. Any profits that the central bank makes (income in excess of its expenses) actually belong to the Treasury. If these 'seignorage profits' are counted as an asset by the bank until it pays the Treasury, there is an offsetting liability in the form of monies owed to the Treasury.

5.1.1 Inside and outside money

In addition to the liabilities of the central bank, a modern economy uses liabilities of commercial banks, or perhaps other financial intermediaries, as transactions media. The public accepts such liabilities as payment for goods or services because they believe in the commitments of the commercial banks to exchange base money for their liabilities on demand. From the perspective of the vendor, the private liabilities are a very close substitute for central bank liabilities because the former can be converted into the latter at low cost.

The liabilities issued by private financial intermediaries are known as 'inside money' because they are not a 'net' asset of the private sector. By contrast, because the liabilities of the central bank are a net asset of the private sector, they are also known as 'outside money'.

In order to fulfil their commitments to supply base money in exchange for deposits on demand, the commercial banks hold vault cash, deposits with the central bank (reserves) and government bonds that are traded in a thick market and that can be readily liquidated if necessary. Financial intermediaries hold less than 100 percent reserve backing for their demand deposit liabilities and include higher yielding, but less liquid, loans and other financial instruments among their assets. This is consistent with a commitment to exchange base money for the liabilities on demand because the fixed costs of exchanging assets make it optimal for each user to increase or decrease holdings at discrete intervals. Under normal circumstances, only a fraction of the outstanding liabilities are exchanged for base money (liquidated) or transferred to other institutions on any one day.

Because commercial banks also hold low-interest rate reserves, and vault cash that yields zero interest, the interest they pay will be below the interest they earn on their commercial loans. Bank customers could earn a higher interest than they receive on their bank deposits by investing directly in the same assets in which the banks invest. The bank liabilities, however, provide additional 'liquidity services'. They are acceptable as a medium of exchange, whereas the higher yielding assets are not.

In practice, there is a spectrum of financial assets with varying degrees of liquidity and explicit interest yields. The marginal liquidity services provided by an asset to a particular individual will generally decline as the individual holds more of that asset. Individuals will alter their demand for different assets until the implicit liquidity yield just compensates for the explicit interest rate differential. Because cash has the lowest explicit yield, it must also provide the greatest level of liquidity services.

One can view financial intermediaries as a device to economise on the use of outside money. Because intermediaries do not need to hold 100 percent backing for their liabilities to make good on their commitment to exchange liabilities for outside money on demand, they effectively permit a given level of outside money to finance more transactions.

5.1.2 *Prices and interest rates*

The money price of a good or service is the number of units of outside money that exchange for such a good or service. The inverse of a price index, such as the CPI, thus measures the purchasing power of outside money in terms of the composite bundle of goods and services that make up the price index.

An increase in the supply of outside money, holding the demand for it fixed, will lower the value of outside money in terms of goods and services. That is, it will raise the price level. By contrast, the supplies of, or demands for, inside money assets do not directly affect the price level, or the value of outside money. Rather, changes in the supply of, or demand for, inside money assets will, in the first instance, produce a change in the implicit liquidity services or explicit interest yield on those assets. Because inside money assets are, however, a close substitute for outside money, fluctuations in the demand for, or supply of, inside money will, in general, also alter the demand for outside money and thus indirectly affect the price level.⁵⁶

Economic theory asserts that the average price level will rise following an increase in the supply of outside money, while the demand for it remains fixed. The theory further predicts that the percentage change in nominal prices will equal the percentage change in the supply of base money. The essential idea is that consumers and producers are always exchanging one good or service for another when they engage in market trades. Thus, the amount they wish to trade always depends on the relative price of the goods or services they care about, not their absolute money prices. As David Hume said in one of the earliest formal essays in economics ('Of Money', 1752):

Money is not, properly speaking, one of the subjects of commerce; but only the instrument which men have agreed upon to facilitate the exchange of one commodity for another. It is none of the wheels of trade: It is the oil which renders the motion of the wheels more smooth and easy. If we consider any one kingdom by itself, it is evident, that the greater or less plenty of money is of no consequence; since the prices of commodities are always proportioned to the plenty of money, and a crown in Harry VII's time served the same purpose as a pound does at present ...

If a currency reform were to change all units of base money, and all inside money claims to base money, by a factor of 100, the value of all nominal prices could simultaneously change by the same factor of 100 and nothing fundamental would be affected. People could make exactly the same trades as they could before the currency reform. One hundred 'old dollars' would simply be re-labelled one 'new dollar', and prices and other nominal amounts quoted in 'new dollars' would be equivalent to one-hundredth of their former price quoted in 'old dollars'.

⁵⁶ More formally, as illustrated in Hartley (1994), for example, the nominal price level and the interest rates paid on inside money assets, each of differing liquidity, will all be determined together in general equilibrium.

5.2 Money, real interest rates and output

The 'quantity theory of money' goes beyond asserting that a currency reform has no real effect. It asserts that a change in the quantity of money in circulation also alters prices just as a currency reform and does not produce any lasting gain to the nation as a whole. Hume is again recognised as the earliest expositor of this theory:

Where coin is in greater plenty; as a greater quantity of it is required to represent the same quantity of goods; it can have no effect, either good or bad, taking a nation within itself; any more than it would make an alteration on a merchant's books, if, instead of the Arabian method of notation, which requires few characters, he should make use of the Roman, which requires a great many.

Hume asserted more than this, however, for he argued that an increase in the supply of money, unlike a currency reform, can have real effects in the short run:

[W]e find, that, in every kingdom, into which money begins to flow in greater abundance than formerly, every thing takes a new face: labour and industry gain life; the merchant becomes more enterprising, the manufacturer more diligent and skilful, and even the farmer follows his plough with greater alacrity and attention.

Many subsequent critics of the classical quantity theory of money unfairly caricatured the theory as asserting that money supply changes affect prices alone (that is, they are said to be 'neutral'). The problem for the classical theory, however, is that the real effects that it acknowledges are not consistent with the formal theory. Hume recognised that they were difficult to explain:

This [stimulating effect] is not easily to be accounted for, if we consider only the influence which a greater abundance of coin has in the kingdom itself, by heightening the price of commodities, and obliging every one to pay a greater number of these little yellow or white pieces for every thing he purchases.

Explaining why money supply changes appear to have short-run real effects remains a challenge for economics and is central to discussions of the appropriate role for monetary policy. It is the central issue of the remainder of this chapter.

5.2.1 *Real business cycle theory*

Some economists, known these days as 'real business cycle theorists', have disputed the claim that money supply changes can have real effects. Real business cycle theory claims that the cyclical fluctuations that others have ascribed to monetary disturbances in fact result from random real shocks that have nothing to do with the monetary system. According to real business cycle theorists, money supply changes are neutral in the short run as well as the long run. They suggest that the observed correlation between money supply changes and aggregate economic activity is the result of reverse causation.

In the real business cycle paradigm, random variations to productivity, energy supplies, the labour force or other real factors cause business cycles. Investment in various sorts of capital (including not just plant and equipment but also inventories and valuable, trained employees) magnifies the initial shocks and spreads their effects over time.

Over-investment in response to shocks can also set the scene for the subsequent reversal of economic booms.

The business cycles caused by such real factors can affect the money supply through a number of channels. If, for example, a positive productivity shock causes investment and output to expand, then the increased level of transactions will raise the demand for money. The increased demand for outside money will, holding other influences unchanged, reduce nominal prices. At the same time, however, the large increase in investment will tend to raise the demand for capital and thus real interest rates. The consequent increase in nominal interest rates will increase the demand for inside money at the expense of outside money. The banking system will expand the overall supply of money and help economise on the base money supply. At the same time, if the central bank is attempting to stabilise interest rates, it will buy government bonds as their prices fall. This would then expand the base money supply. The net result is likely to be an expansion of both the inside and outside components of the money supply. Output and money supply movements would be positively related, but the co-movement of monetary with real variables results from, rather than causes, the real fluctuations in output.

The major difficulty with the real business cycle theory is that it cannot explain large depressions or financial crises, such as the Great Depression or the recent financial crises in Asia. Many mild fluctuations in market economies, and perhaps episodes such as recessions associated with constraints on the supply of oil, do appear to be consistent with the real business cycle theory. Major depressions, however, often appear to be caused by banking panics, bank failures, and other financial disturbances. There are no plausible real shocks of sufficient magnitude to explain such episodes.

Most economists also have serious doubts that many 'normal' business cycles are caused by real supply or productivity shocks. There are at least two grounds for scepticism. In many cyclical swings, the originating real shocks are difficult to identify. Constraints on energy supplies are the most reasonable example of negative real shocks causing recessions. Periods of rapid technological advance, such as the 1920s and the 1990s, also appear to be associated with higher average economic growth rates and perhaps more muted business cycle fluctuations. Other types of real shocks are, however, difficult to identify.

Another source of scepticism regarding, in particular, the reverse causation theory of the correlation between money supply changes and real variables is that the timing of events often does not appear to be consistent with this interpretation. The reverse causation argument suggests that real fluctuations ought to precede variations in the money supply, whereas the evidence suggests that money supply changes often come first.

5.2.2 Unanticipated money has real effects

An alternative explanation for short-run real effects of money supply changes is that they may be related to the real effects of 'unanticipated' inflation. As we noted in Chapter 2, unanticipated inflation amounts to an unexpected change in the value of the monetary

measuring standard. An increase in nominal demand that is the result of a monetary expansion is misperceived as higher real demand for output. Producers respond by supplying more output, rather than simply raising their prices. Subsequently, producers discover that they were mistaken. As they attempt to spend their income, they find everyone else has more money to spend too. Producers conclude that they should have raised their output price in line with the distortion in the value of money rather than treating the shock as a real increase in demand. The interim increase in output, however, delays the upward adjustment of prices.

The theory that the real effects of money supply changes are caused by unanticipated changes in the value of money can explain why output moves simultaneously across different industries and geographical locations that are using the same monetary standard. For example, business cycles are more highly correlated across the states of the United States than between the United States plains states and the Canadian prairie provinces. If business cycles were caused predominantly by real shocks, we might instead expect locations with a similar industry structure to have business cycle expansions and contractions at the same time. The key explanation of correlated output movements under the misperception theory is that many different producers are using the same monetary measuring standard. Therefore, they all tend to make the same mistake when that standard is distorted in an unanticipated way.

The strongest evidence in favour of the view that only unanticipated money supply shocks affect output comes from economies suffering from extreme inflation (not only the hyperinflations in Europe in the 1920s, but also the somewhat less severe inflations in Latin America, Israel and other countries in the second half of the twentieth century). As the level and variability of inflation rises, the real effects of money disturbances tend to disappear. People come to associate almost all movements in nominal demand with monetary shocks. People cease to respond to a demand signal by supplying more output, and the result is that changes in nominal demand quickly increase prices.

The way that major inflations have ended also supports the theory. Once the public has experienced high rates of inflation (10 or more percent per annum), it comes to understand that expansion of the base money supply is the only source of such disasters (reductions in the demand for the base in the face of economic growth and growth in the demand for transactions balances could explain, at most, a few percent annual inflation). In turn, the expansion of the monetary base results from the central bank being forced to monetise government debt.

Gimmicks aimed at controlling the inflation rate that do not stop the expansion of the monetary base have no effect on the inflation rate or inflationary expectations.⁵⁷ Only

⁵⁷ Examples of such policies include wage and price controls, or pegging the exchange rate to a foreign currency. If expansion of the domestic monetary base is not controlled, attempting to peg the exchange rate leads to a loss of foreign exchange reserves and ultimately de-stabilising speculation on the inevitable currency devaluation. Sometimes the exchange rate peg is accompanied by restrictions on foreign investment. Firms exporting or importing goods or services nevertheless can speculate on the exchange rate change by pre-paying for imports or delaying the repatriation of revenue earned abroad.

fundamental reforms that prevent the government from forcing the central bank to monetise government debt eliminate inflation from the system.

Furthermore, when suitable reforms are instituted in an economy suffering from extreme inflation, the inflation rate very quickly stabilises with real effects that are no more severe than a normal business cycle recession. This is contrary to the next theory we discuss, which implies that there is a stable trade-off between inflation and real variables. In such a world, eliminating inflation rates of 100 or more percent per annum ought to obliterate the real economy. It does not do so because people are smarter than they are implicitly assumed to be in models predicting a stable trade-off between output or employment, and inflation. When the institutions are changed, expectations adjust to the new reality and inflation changes quickly without substantial or prolonged real effects.

In economies experiencing inflation rates below 10 percent per annum, the real effects of monetary shocks appear to be too large and too long-lasting to be explained solely by temporary measurement errors or mistakes resulting from unanticipated inflation. Furthermore, in an advanced economy, information about changes in the money supply, interest rates and price indices is readily available. Money supply changes that are predictable using past publicly announced information ought to be anticipated. Statistical tests in countries such as the United States find, however, that predictable money supply changes appear to have real effects. This is not consistent with the theory.

5.2.3 *Nominal rigidities*

Following the lead of Keynes in *The General Theory of Employment, Interest and Money*, the explanation that many economists give for short-run real effects of anticipated or known money supply changes is that people in general, and workers in particular, are irrational. Either nominal prices and wages are not set to reflect anticipated inflation rates, or people choose irrationally not to index nominal contracts as inflation is realised and measured.

Keynes focused on nominal wage rigidities. Fluctuations in aggregate employment were the central issue about which Keynes was concerned in his book, as the title indicates. Prior to Keynes, economists studying the business cycle focused on fluctuations in investment and firm profits, which have a far greater amplitude. Indeed, aggregate employment fluctuates less over the business cycle than does aggregate output. Nevertheless, in so far as employment fluctuations take the form of variations in the number of employed workers rather than in hours of work, they have particularly severe implications for people who lose their jobs in an economic downturn.

The explanation given by Keynes for changes in employment in response to monetary expansions or contractions was that prices of goods or services adjusted much more quickly to changes in the money supply than did wages. As Bernanke *et al* (1999, p 13) summarise the argument:

[I]f wage rates are fixed ... and prices unexpectedly rise, then the profit margin of firms will increase, giving them an incentive to produce more goods and services ... In effect, firms choose to produce more because unexpected inflation implies an unexpected decline in the real cost of production.

Bernanke *et al* also observe that this argument could at best explain a short-run effect:

[W]orkers are no more likely than firms to ignore their own economic interests. Once they realize that inflation has risen, they will demand more rapid wage increases to compensate for their lost buying power. As the rate of increase in wages begins to match the rate of increase in prices, the profit margins of firms, and hence their rate of production, will return to normal. The net result is that, in the long run, only the inflation rate has been affected by the expansionary monetary policy; output and unemployment have returned to their normal, or “natural”, rates.

Keynes was aware that the employment effects of money supply changes may only be temporary when nominal wages are rigid. Indeed, he probably intended to develop a theory that allowed money supply changes to have short-run real effects, but to be neutral in the long run. The empirical observations that supported the classical quantity theory view of the world were that money supply changes had initially temporary real effects, but ultimately affected only the average level of nominal prices and did so with a lag.

A major empirical difficulty for the simple Keynesian model, noted soon after the theory was developed, is that real wages do not vary over the business cycle in the way that the theory predicts. More recent theories implicating nominal rigidities in causing real effects of money supply changes have, instead, assumed that both prices and wages adjust slowly. The theory no longer predicts a particular relationship between the business cycle and movements in the ratio of nominal wages to prices, that is, ‘real’ wages.

A number of ways have been proposed for reconciling nominal rigidities with rational behaviour. For unskilled labour, leaving the labour force and drawing unemployment and welfare benefits may be a relevant alternative to employment. Because these benefits are often fixed in nominal terms for long periods of time, they might alter the supply of unskilled labour as prices fluctuate. A rise in prices that reduces the real value of benefits may encourage an increase in the labour supply and a tendency for the real wage to fall. This would be measured as a degree of nominal wage inflexibility for such categories of labour.⁵⁸

Most economic explanations of rigid prices or wages become, on close examination, theories explaining ‘real’ rigidities, not nominal ones. People care about real consumption levels, real effort levels and real incomes. If there is a currency reform that changes all nominal prices and wages, and all money balances, by the same proportion, people do not care. It takes the same amount of labour time to buy any good or service as it did before the currency reform. Similarly, there is no rational reason for anyone consciously to ignore the fact that, for example, a constant nominal wage in the face of inflating prices alters the real terms of an employment bargain.

⁵⁸ The question may then become why it might be rational for the government to leave the welfare benefits unchanged in nominal terms. Presumably, the existing level of benefits in real terms represents some type of ‘political equilibrium’. Indeed, it has become increasingly common for benefit levels to be indexed to the CPI.

Menu costs

One attempt to provide an economic explanation of nominal rigidities is the so-called 'menu costs' model.⁵⁹ The idea is that real resources, such as labour time, are required to gather information needed to determine the appropriate price adjustment or to change the prices, for example, on a menu. Hence, it may be rational to leave prices fixed in nominal terms, and inappropriate in real terms, because there are costs associated with changing them.

The menu costs model begins with the observation that if initial relative prices are profit maximising, a small change in those relative prices will have a negligible effect on profits. Thus, firms will have little incentive to adjust the nominal price of their output, if the average level of prices charged by other firms changes. When there are even small costs of adjusting nominal prices, it will be optimal for an individual firm to allow relative prices to deviate from the profit maximising level before adjusting them.

The models also assume that the world is characterised by monopolistic competition, so that equilibrium outputs are below the optimal level. As a result, while the private benefits of adjusting nominal prices are small, the social benefits can be large. If all firms cut nominal prices simultaneously, relative prices would remain unchanged. The resulting increase in the real value of money balances would, however, increase the overall level of real demand. In a monopolistic world of below-optimal output, such an expansion in market activity could significantly enhance overall welfare, even though the effects on individual firm's profits are negligible.

The major factor influencing the calculations of an individual firm is its own price relative to the prices of its nearest competitors. Profits will be much more sensitive to this relative price than to the increased expenditure that accompanies a nominal price reduction by just one firm. The latter will be shared by all firms in the economy and thus will be a negligible factor in the calculations of any one firm.

There are a number of problems with the menu costs model. It is doubtful that the cost of changing prices would exceed the cost of changing employment or output. This is particularly so in an age of electronic cash registers connected to central data bases of prices that can be changed at a moment's notice and even without explicit human intervention. For example, a computer programme could automatically retrieve the latest CPI numbers from the web and index all nominal prices and wages in a database accordingly. At the same time, increasing skill levels of employees make it more costly to lay off trained workers in a downturn and replace them by untrained workers when the demand for output recovers. Small costs of changing quantities such as employment or output would mitigate against an individual firm allowing the relative price of its output to fluctuate.

The empirical relevance of the pervasive monopoly envisaged by the menu costs model can also be questioned. In a small open economy, extensive foreign competition makes many industries very competitive.

⁵⁹ The menu costs model is discussed, for example, in Akerlof and Yellen (1985), Mankiw (1985) and Blanchard and Kiyotaki (1987).

The menu costs model would also appear to imply that the cyclical nature of an industry ought to increase as the competitiveness of the industry declines. There is, however, no evidence of such a relationship. For example, home construction is one of the most cyclical of industries and also a very competitive one. It does not seem likely that output in the home building industry fluctuates substantially because a lack of competition discourages home builders from lowering their prices in a recession. There is also no evidence that a change in the competitive conditions in an industry affects its cyclical nature.

There are more general problems with all theories that attribute the real effects of money supply changes to slowly adjusting prices. To begin with, the lag in the full adjustment of prices to a money supply shock appears to be substantially longer than the real effects of a money supply change. If the lagged adjustment of prices is causing the real effects, the latter ought to last for at least as long a time period after the shock as do the former. Later in this chapter, we discuss a model in which money shocks have short-run real effects while prices respond to money supply changes with a long and variable lag. The lag in the adjustment of prices does not cause the short-run real effects, although the short-run real effects do contribute to the lagged adjustment of prices. When a money supply shock affects output, interest rates, and the level of transactions, the demand for money will also be affected. The change in the demand for money will then affect the average level of prices. The fundamental source of the lagged adjustment of prices arises, however, from a different source, so it is possible for the real effects and the lagged price adjustment to occur over different time spans.

Another problem for models that attribute real effects of money supply shocks to nominal rigidities is that all such models attempt to explain rigid price levels. In application, however, the model ought to be trying to explain rigid inflation rates. In an economy experiencing even moderate inflation, nominal variables are continually being adjusted. If nominal rigidities are to explain real effects from changes in money supply growth rates, the inflation rate has to adjust imperfectly to changes in money growth rates. Once people are adjusting prices or wages, however, it is not clear why it is more difficult to make a correct inflation adjustment than an incorrect one.

Some statistical studies have attempted to measure the extent of nominal rigidities. There are problems with much of this work. Most investigations use government price indices, such as the CPI, that are based on list prices rather than transactions prices, which tend to respond much more rapidly to supply or demand shocks. In addition, studies of nominal rigidities typically make no allowance for changes in the qualities of goods, services or jobs. If quality adjustments are not considered, changes in prices and quantities will be measured incorrectly.⁶⁰ Despite the defects of many of these studies, however, there is little doubt that nominal prices do adjust slowly to changes in the

⁶⁰ A famous example of quality adjustment involves magazines. Cover prices of magazines often remain fixed for long periods. The purported explanation is that there are hidden costs of adjusting the price. Upon close investigation, however, it was discovered that the ratio of column inches of news stories to column inches of advertising varies systematically as the real price of the magazine changes. A more important example we discuss in the next section involves labour markets. The ability to alter the quality of a job (within limits) means that constant wages per hour of time on the job may translate into varying wages per hour of 'effective' labour input.

money supply. Since Keynes published *The General Theory of Employment, Interest and Money*, we have become accustomed to thinking that slowly adjusting nominal prices necessarily mean that money supply changes have short-run real effects. The banking model discussed later in this chapter provides a counter-example to this belief.

Minimum and award wages

Minimum and award wages are one type of rigidity that may allow money supply increases to raise employment and output.⁶¹ These are usually specified in nominal terms and only adjusted sporadically in response to changes in the cost of living. As a result, the extent to which the minimum wage adversely affects employment, and hence other real variables, can vary as prices change between wage adjustments.

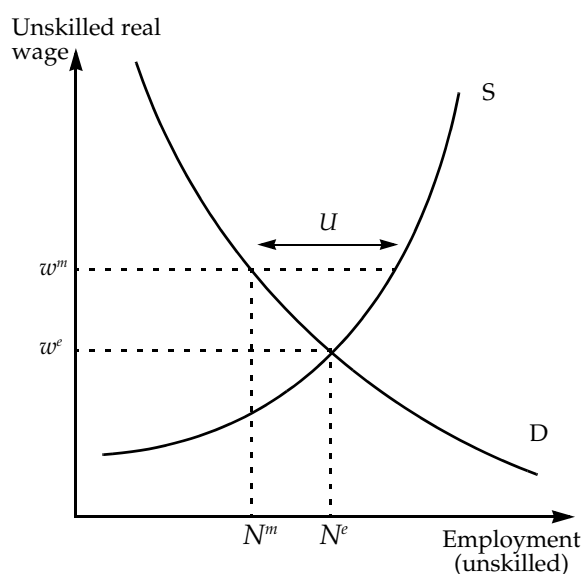


Figure: 5.1: Employment effects of a minimum wage

Figure 5.1 illustrates the usual analysis of the employment effects of a minimum wage that is effectively enforced.⁶² In a free and competitive labour market, the equilibrium real wage for unskilled labour would be w^e and the equilibrium level of employment would be N^e . A minimum wage that is 'binding'⁶³ may be set at a level $w^m > w^e$. The demand for the affected categories of labour (called 'unskilled' in the figure) would decline from N^e to N^m . Until workers become discouraged by their inability to find employment, the higher real wage will attract some people to enter the labour force to look for jobs (labour

⁶¹ As we noted in Chapter 2, because the tax base is defined in nominal terms, changes in the inflation rate also alter the real burden imposed by taxes. These effects work in the 'wrong' direction, however, because they imply reduced output at higher inflation rates.

⁶² Minimum wage laws attempt to eliminate mutually agreeable trades between consenting parties. Rather than becoming unemployed, a worker has an incentive, for example, to acquiesce in falsifying recorded hours of work, or to become an independent contractor.

⁶³ A minimum wage that is set below the equilibrium real wage is not binding and should have few, if any, effects on the market outcome.

supply increases). The queue of individuals searching for a job is measured as increased unemployment U .

The costs of a minimum wage include both the net value of the lost employment opportunities for workers and the net value of the lost output from firms. There may also be losses associated with increased unemployment as individuals spend more time and other resources searching for the limited jobs available at the legal minimum or award wage. Losses in current employment may also have future costs as individuals who are denied valuable work experience suffer a reduction in future productivity. Previously acquired work skills also tend to depreciate as people spend time out of the work force.

A system of legally prescribed award wages can be analysed as analogous to a minimum wage for unskilled labour. An award wage may be viewed as a minimum wage for a narrowly defined category such as skill, industry of employment, years of experience and so on. An additional cost of an award wage system that is not captured in Figure 5.1 is that such a system suppresses many variations in wages that would otherwise be observed. We would expect some relationship between the wages that are paid for similar jobs in different industries, or different locations, because the employers are drawing on a common labour pool. The marginal products of workers in a particular job classification are likely, however, to vary from one industry to the next. Even in the same industry, different employers use different technologies, so the marginal products of workers apparently doing the same job are likely to differ. Finally, similarly classified jobs in different industries or locations are likely to have different non-pecuniary characteristics. This would also lead to wage variations as workers and firms compete on the attractiveness of the overall employment opportunity and not just wage rates. By suppressing wage variations, an award wage system distorts the allocation of workers across firms, industries and locations, imposing losses that are additional to those captured in a simple diagram such as Figure 5.1.

Some individuals who are displaced from sectors covered by a minimum or award wage take jobs in uncovered sectors at a reduced wage rate. The opportunity to find work in occupations that are not covered by legally prescribed wages lessens the adverse impact of the law on overall levels of employment. Some of the effects of prescribed wages are, however, spread from the covered to the uncovered sectors. Workers in the latter sectors suffer declines in their real wages, while their employers benefit from the lower real wages. In addition, because the marginal product of labour is higher in the covered than the uncovered sectors, the value of output could be increased by transferring labour back to the covered sectors.

Some adverse effects of binding minimum or award wages are more difficult to measure. Just as binding rent controls distort the quality of the housing stock, prescribed wages distort the quality of labour services exchanged in the market place. The quality of labour services can be identified with the amount of 'effort', or the net output per hour of labour input. Many firms can adjust their operations to increase the amount of effort per hour of labour input. Consider, for example, a firm operating an assembly line. When a minimum or award wage that exceeds the current productivity of workers is imposed,

the firm may be able to afford the wage by making the assembly line run faster. This will make the workers worse off, and may also raise costs by, for example, increasing wear on the equipment or the proportion of defective products. Yet it may enable the firm to stay in business without having to lay off workers.

Other changes in working conditions might also affect the supply of marketable output per hour of labour input. For example, employers can increase supervision, decrease the number or length of work breaks, reduce the amount of socialising on the job, cut fringe benefits, reduce work place cleanliness or safety, reduce training time or expenditure or take greater efforts to control losses from breakage or pilfering. To facilitate a simple graphical analysis, we focus on the trade-off between real wages and a variable we shall designate as 'effort'. It should be understood, however, that there are many ways to alter the amount of marketable output obtained per hour of labour time input.

Modifications to technology or work practices may require additional maintenance, additional supervisory staff, extra equipment, or other expenditures by the employer. Increases in effort e initially enable the employer to pay a higher real wage w while maintaining profits. As effort increases, the marginal product of effort decreases, and the marginal cost of enforcing even higher effort levels increases. Hence, as w increases, larger increases in effort are required to compensate for equal increases in w . This gives a curve of combinations of e and w in Figure 5.2 where profits are constant. Beyond some level of effort, \hat{e} , further increases in e reduce the level of w that the firm can pay. The equal profits curve in Figure 5.2 therefore becomes negatively sloped for $e > \hat{e}$.

Employees are also likely to be made worse off as e increases. The work environment may become less pleasant, or employees may be forced to expend more energy per hour of work. On the other hand, workers prefer a higher real wage. This leads to a set of indifference curves, with each one tracing out combinations of w and e that produce a

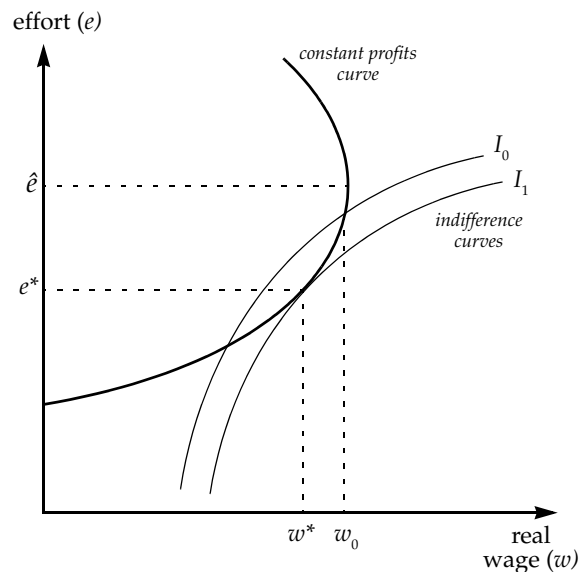


Figure: 5.2: Adjusting the quality of a job

particular level of satisfaction for the employee. Two of them are graphed in Figure 5.2, with satisfaction levels $I_1 > I_0$. To remain indifferent, an employee must be compensated by higher wages as e increases. Hence, the indifference curves are positively sloped. The curvature follows from the assumption of decreasing marginal utility of wages and increasing marginal disutility of effort. As e increases, larger increases in w are required to compensate for a given increase in e . If the parties to the employment agreement are left to bargain freely over the wage and non-pecuniary aspects of the job, they would reach a solution where w equals w^* and e equals e^* , as illustrated in Figure 5.2. This combination makes the employee as well off as possible, while allowing the employer to earn a competitive level of profits.⁶⁴

Now suppose the firm and the worker are forced to negotiate in the context of a minimum wage law specifying that the worker must be paid a (real) wage w_0 per hour. The firm can pay the higher minimum wage by increasing the amount of effort of the employee, but the deal between the employer and employee is no longer efficient. The employee would be happier earning a lower real wage while putting forth less effort.

If the exogenous minimum is too high, there may be no level of e that enables the employer to pay w_0 and earn a competitive profit. The minimum wage would then produce unemployment as in the standard analysis.⁶⁵ Alternatively, the employer might have to increase e so much that the worker decides to search for another job, or choose unemployment and the unemployment benefit. There may, however, be a range of exogenously imposed real wages that do not lead to unemployment. Such wages would nevertheless impose losses.⁶⁶

All of these real costs of prescribed wages will be affected as price changes convert a fixed nominal minimum into a varying real minimum. Changes in the money supply that alter the average level of nominal prices can thus affect the extent of losses accompanying prescribed wages.

While the responses of employers and employees to the varying real value of prescribed wages may be rational, there would still appear to be an irrationality in the outcome. Presumably, the prescribed wages and benefits represent some type of 'political equilibrium' that balances the beneficial effects accruing to decision makers, such as politicians, union leaders or labour court judges, at the expense of the undesirable economic costs imposed by excessive real wages. Unless the decision makers or their supporters are irrational, however, the political trade-off ought to be in real terms. The

⁶⁴ The model can be extended, as discussed in Hartley (1992), to allow for 'rents' in a particular match of employer and employee to be shared in the form of profits in excess of a competitive level for the firm and utility in excess of what could be obtained in the next best match for the employee.

⁶⁵ In the short run, the firm only needs to cover its operating costs to remain in business. It may be willing to earn less than a competitive rate of return on its capital stock for a short period, as long as it expects to be able to earn more than the competitive return in the future. The firm may be reluctant to lay off employees to cover a temporary decline in profits when it has invested in a relationship with those employees.

⁶⁶ A parallel argument implies, for example, that the imposition of excessive safety standards in the work place may tend to lower real wages.

legal minima ought to be adjusted, perhaps through indexation, to maintain the same real trade-off as prices vary. We return to this issue after discussing how increases in minimum and award wages may interact with monetary policy.

Legally prescribed wages and monetary policy

In Australia and in New Zealand in earlier years, as well as many European countries, centralised nominal wage determination tribunals have been accused of facilitating a type of 'cost-push' inflation that would appear to contradict the idea that substantial inflation is always caused by excessive growth of the money supply. The centralised wage fixing tribunal imposes nominal wage increases that are binding for many employers. The higher wages eventually lead to higher costs, and, thus, higher nominal prices, but in the interim employees enjoy higher real wages. Nominal prices and wages can end up at any level merely at the whim of the wage fixing tribunal.

The primary difficulty with this notion is that it fails to explain how the demand for, and supply of, base money remain in equilibrium. An increase in all nominal prices will, other things being equal, raise the demand for base money. The inflation thus cannot occur without an increase in base money supply. The latter, in turn, can only be produced by the central bank.⁶⁷ The cost-push model thus must be assuming implicitly that the central bank accommodates any wage decisions made by the wage fixing tribunal by expanding the supply of base money.

Another difficulty with the argument is that an increase in nominal wages that does not immediately increase nominal prices will raise real wages. If this increase is artificially imposed by a tribunal and does not reflect productivity gains, it should in turn lead to increased unemployment and the other real costs discussed in the previous section.

The apparent phenomenon may be explained if monetary policy reacts to the unemployment rate. Perhaps as a result of political pressure from the government, the central bank may respond to a rise in unemployment by expanding the money base.

It is also possible that the rise in nominal wages will itself raise the demand for transactions balances. If the money base were left unchanged, the result would be an increase in interest rates. Then a central bank that was following a policy of stabilising interest rates would respond by expanding the money base.

Regardless of the exact feedback mechanism, it is feasible that nominal wage increases would induce a central bank targeting something other than the long-run rate of inflation to expand the money base. After the central bank expands the money base, nominal

⁶⁷ Strictly speaking, this statement applies only to a closed economy or an open economy with a flexible exchange rate. As we explain later in this chapter, in an open economy with a fixed exchange rate, the central bank relinquishes its ability to control the base money supply in order to fix the foreign exchange value of the currency instead. In an open economy with a fixed exchange rate, the necessary increase in base money supply required to support an exogenous nominal wage increase could accrue through a balance of payments surplus. This does not seem, however, to be a likely outcome of higher nominal wages in the absence of other changes in central bank policy. Without presenting detailed arguments here, it seems unlikely that open economy considerations could rescue the 'cost-push' inflation idea.

prices will rise and the original disequilibrium real wages will return to their previous values until a new round of nominal wage increases is put in place.

The lack of indexation of the exogenous nominal wage increases again appears to imply a certain degree of irrationality. If workers can obtain higher real wages in the short run, why might they allow those higher real wages to be eroded by subsequent inflation? The optimal strategy would appear to involve indexing nominal wages to the subsequent price increases.

One explanation may be the temporary nature of the resulting real wage increases. As we noted above, firms have many ways of adjusting to increases in real wages that protect profits while avoiding the need to lay off workers. These alternatives could appear more attractive if the increase in real wages is temporary and not too large.

From the perspective of employees, therefore, real wage increases that are guaranteed to be temporary may be preferable to permanent increases in real wages, which would reduce the demand for labour to a much greater extent. Workers might also prefer a certain amount of real wage variability if, for example, they have the opportunity to vary their hours of work and their holiday times. They can supply more hours when real wages are temporarily high, and take more time off when real wages are temporarily low.

If the temporary episodes of higher real wages are repeated too often, however, employers may regard them as permanent. The unemployment rate is then likely to rise substantially, while the average level of real wages may decline to compensate shareholders for the increased risks associated with employment contracts.

5.2.4 *Real rigidities*

It takes time and other resources to reallocate workers from one industry or location to another. Workers need to expend resources to discover new employment opportunities. It is also costly for employers to hire and train new workers. Employment relationships are a type of investment and workers will delay quitting, and employers will delay dismissing workers, following real wage changes, until the increases are perceived to be permanent.

In addition, employment contracts effectively insure employees against fluctuations in the marginal product of labour. The employees are guaranteed a relatively fixed payment, with the residual difference between that payment and the marginal product of labour accruing to shareholders. Similarly, interest payments on bonds are much more stable than the marginal product of capital. In effect, these other factors of production trade some of their risks to the shareholders. Shareholders are in turn more willing to bear risk because capital markets provide opportunities to reduce risk through portfolio diversification.⁶⁸

⁶⁸ Profits are the most cyclical of all economic variables. Investors, and the financial press, focus on predicting business cycle turning points because business cycle risks are such a critical part of the systematic risk that investors have to bear.

Search and adjustment costs imply that real wages and employment will take time to adjust to changes in the demand for, or supply of, labour. Aggregate output and employment are likely to be adversely affected by any shock that has a pervasive effect on the economy including, for example, changes in energy supplies or prices.

Impediments to the smooth functioning of markets will raise the costs of reallocating resources in response to major shocks no matter where those shocks arise. Many of these impediments are the result of ill-advised government policies.

As argued above, exogenously imposed award or minimum wages can destroy employment opportunities or produce less than efficient employment contracts covering wages and working conditions. Minimum and award wages also limit the diversity of employment contracts and discourage the efficient allocation of workers to different jobs or locations. Award wages are also likely to be inflexible in the face of changing technology or other changes in an industry and, consequently, are likely to slow adaptation to, or exploitation of, the new circumstances.

Unemployment benefit programmes subsidise workers searching for jobs and can encourage workers to search for longer than is efficient. If benefits are tied to obtaining employment in particular industries, they can also discourage workers from learning new skills or shifting occupations when demand for their current skills or occupations declines. Similarly, long-term unemployment benefits can discourage workers from migrating to other regions when the demand for their services in their current locations declines.

Legal impediments to hiring and firing workers raise the costs of taking on new employees. They discourage firms from taking advantage of new opportunities and produce slower adjustments to shifts in demand between goods and services.

Unnecessary licensing requirements or other job qualifications can create artificial barriers to entry into particular jobs or professions for workers who may be well qualified. For example, foreign-trained immigrants may be well-qualified medical personnel, but their qualifications are not recognised in New Zealand.

5.2.5 Monetary policy disrupts financial intermediation

In the next two sections, we provide an alternative explanation (based on Hartley, 1990, 1994 and 1998) for short-run real effects of known money supply changes, and long time lags from money supply changes to subsequent price movements.⁶⁹ The main idea is that such changes initially disrupt the operation of the banks and only gradually affect the rest of the economy. In this context, rigidities in labour markets magnify the costs of monetary disturbances, but are not fundamental to explaining why those effects arise.

⁶⁹ The work underlying the models discussed in this section is incomplete. For example, the ideas have not been tested empirically, although some limited tests have been conducted on related ideas. The explanation is presented here on the understanding not that it represents an established viewpoint within the profession but rather to assist the reader in understanding the conceptual framework underlying the discussion in the text.

The price level is ultimately tied to changes in the supply of, or demand for, base money. Thus, if nominal pricing errors are the main source of real effects of money supply changes, those real effects ought to have a high correlation with base money changes. Statistical evidence, however, ties the real effects of money supply changes to changes in inside money components (that is, the part of the money supply that is issued by banks) more than to changes in the base.⁷⁰

Williamson (1987, 1988) and Bernanke and Gertler (1989), among others, have focused on disparities of information between banks and their borrowers, both as a motivation for bank lending and as an explanation for bankruptcies among borrowers from banks.⁷¹ An implication of these models is that other financial market institutions including, in particular, markets for corporate debt and equity are not a perfect substitute for banks. As a result, fluctuations in bank lending can have real effects. For example, a contraction in bank lending is not completely offset by an increase in borrowing by floating corporate debt or equity (a process that is also called 'disintermediation', or circumvention of financial intermediaries). An under-emphasised feature of the Williamson and Bernanke and Gertler models, however, is that banks finance all investment so that disintermediation is impossible.

In practice, while some firms may be restricted to bank finance, other firms might be able to borrow either from banks or by floating equity or corporate bonds. These firms could arbitrage interest rates across competing sources of finance and ensure that bank loan interest rates do not deviate from rates on other loans of comparable risk. Disintermediation would become irrelevant only if none of the firms borrowing from banks has alternative sources of finance.

Hartley (1998) provides an explicit general equilibrium model in which changes in the amount of bank lending, and thus also the amount of bank deposit liabilities, can have substantial real effects even though disintermediation is possible. This 'banking model' of the short-run real effects of money supply changes allows for the possibility that small firms may be restricted to bank finance. It also assumes, however, that some firms can borrow either from banks or directly from capital markets. Arbitrage by those firms ties bank interest rates to the prevailing interest rate in the capital market. The model nevertheless shows that fluctuations in bank lending can alter total investment, output

⁷⁰ For example, Bernanke (1983) and Hamilton (1987) relate the severity of the Great Depression to the collapse of intermediation. Bernanke (1986) and Friedman (1983, 1986) found significant real effects of fluctuations in bank credit in more recent business cycles. Rush (1985, 1986) and Manchester (1989) claim that variations in the M2 money multiplier are correlated with output fluctuations. Rush and Loungani (1995) provide evidence that changes in reserve requirements affect real activity by changing the supply of commercial and industrial loans from banks. Haslag and Hein (1992, 1995) present evidence that changes in required reserves have a different economic impact than changes in the base.

⁷¹ Because lenders know less than borrowers about investment outcomes, borrowers have an incentive to hide returns and reduce loan repayments by rescheduling debt or declaring bankruptcy. It is expensive for lenders to check the veracity of a borrower's assertions about solvency. Financial intermediaries can reduce the costs of monitoring borrowers by providing the service simultaneously to many lenders. Williamson (1987) argues that the optimal lending contract for the bank involves lending at a fixed interest rate and then monitoring the borrower and accepting the value of the project net of monitoring costs in those cases in which the borrower is bankrupt.

and other aggregate variables. The key additional assumption required to derive this result is that households face borrowing constraints, or restrictions on their ability to borrow against future income in order to finance current consumption. In the rest of this section, we summarise the intuition that the model attempts to represent in a more formal way.

Commercial banks can be viewed as harnessing a demand for a medium of exchange in order to finance investment. The loans provided by commercial banks are in addition to lending from households that wish to save current income in order to finance future consumption. The underlying motivations for holding bank deposits and other assets such as bonds or equities differ. Households demand bank deposits because they desire to hold an asset that is acceptable as a means of payment for goods or services. The savings undertaken by households to finance future consumption are invested in higher yielding, but less liquid, assets such as corporate bonds or equities, mutual fund shares, superannuation funds, insurance policies and so on.

The deposit liabilities of banks can be thought of as claims to the base money that is held by the banks as reserves. The bank deposits are, however, also indirect claims to capital, or the loans and other interest-bearing assets held by the banks. Banks thus permit claims to earnings on productive capital and other long-term investments to displace base money as a means of financing transactions. In effect, the banking system increases the total supply of funds available to borrowers, and thus tends to lower equilibrium interest rates.

If households did not face borrowing constraints, they would borrow until the riskless real interest rate left them indifferent between consuming today and consuming tomorrow. Banks would then have little impact upon equilibrium real interest rates. Increased household borrowing would compensate for the increased lending from banks, and the net impact of banks on the real economy would be negligible.

In the more realistic situation in which households face borrowing constraints, the additional lending from banks is not absorbed by increased borrowing from households. The equilibrium riskless real interest rate can then be driven down below the rate that would make households indifferent between marginally raising current consumption at the expense of future consumption.

It might seem counter-intuitive that a model could produce an equilibrium interest rate that would appear to give nobody an incentive to save. The primary explanation, however, is that in a world in which people cannot buy insurance coverage for the many random events that can affect their welfare, financial assets provide services other than transferring consumption from the present to the future.

In a world in which interest rates are below the effective household rate of time preference, households with few assets would like to borrow to maintain their consumption when their current desired expenditure exceeds current income. The borrowing constraints prevent them from doing so.

Households already owning substantial assets also continue to accumulate bank deposits and cash as their wealth increases, because they need monetary assets to finance

their consumption purchases. There is a limit, however, to the extent to which households will accumulate wealth, because equilibrium riskless real interest rates are below the household rate of time preference.⁷² In the model economies analysed in Hartley (1994, 1998), households nevertheless continue to invest in riskless bonds to a surprising extent. The explanation is that the assets provide implicit 'self-insurance services' that enable the household to maintain desired expenditure if unforeseen events reduce future income or increase desired expenditure. There is an upper limit on the amount of wealth that any one household is prepared to accumulate, however, because the value of these implicit insurance services declines as wealth increases.

Because the equilibrium riskless real interest rate is reduced by the presence of banks when households also face borrowing constraints, the equilibrium aggregate capital stock will be raised. The increased lending from banks is not absorbed by household borrowing, and instead leads to additional investment from firms.

While the equilibrium capital stock is higher in an economy with both banks and household credit constraints, investment is also more vulnerable to financial disturbances. The demand for funds for investment is a downward sloping function of the riskless real interest rate. As the real interest rate increases, fewer investment projects will have a positive net present value and the demand for funds declines. On the other side of the capital markets, household demand for an asset depends on the liquidity and insurance services that asset provides. In turn, the liquidity services provided by monetary assets, and the proportion of households that are credit constrained in any period, both depend on the interest rate. As a result, firms face an upward sloping 'liquidity preference' supply curve of investment funds as a function of the real interest rate.

The intersection of the downward sloping demand curve and the upward sloping supply curve determines the equilibrium real interest rate in the economy and the equilibrium level of investment and other real variables. Variations in the transactions demand for inside money, or the costs of intermediation, shift the supply curve of funds and alter equilibrium interest rates and investment.

The predictions of the banking model outlined in this section coincide to some extent with the predictions of the Keynesian nominal rigidities model discussed above. The liquidity preference supply curve of funds in the banking model can be related to the LM curve in a Keynesian nominal rigidities model, while the investment demand curve for funds in the banking model is related to the IS curve. The implications of the two models for monetary policy are, however, very different. In the Keynesian nominal rigidities model, decision makers are assumed to behave irrationally by deliberately ignoring economic information relevant to arranging trades of labour services, goods and so on. This theory essentially makes the case for activist monetary policy 'by assumption'.

⁷² In practice, people may accumulate wealth beyond this limit because consumption also takes time. Thus, Bill Gates, for example, probably continues to work because he enjoys what he does, not because of the income he earns. The limited time he has to consume, or to supervise charitable donations made on his behalf, means that he probably could not spend money fast enough to prevent his wealth from increasing. The model discussed in the text does not require time input to consume.

Because individuals are behaving irrationally, the government needs to intervene and engineer through monetary policy the nominal wage and price changes that individuals are stubbornly or foolishly refusing to make.⁷³

By contrast, the rigidities in the banking model are not so obviously supportive of active government stabilisation policy. There are two types of rigidities in the banking model. First, the lack of insurance markets for income or expenditure shocks leads to a demand for monetary assets and a desire to save despite low real interest rates. The second type of rigidity is the difficulty that households have in borrowing against future labour income. The fundamental cause is that human capital is unsuitable as collateral on a loan. As a result, households have difficulty convincing a potential lender that they will not default on future loan repayments.⁷⁴

There is independent statistical evidence on the importance of borrowing constraints at the macroeconomic level. The permanent income hypothesis suggests that household consumption ought to be more closely related to the normal income that a household could expect to earn in the future than to its current income. A household experiencing a temporary windfall of higher than normal income ought to save most of that income and increase consumption in all future periods, not simply spend the lot in the current period. Conversely, a household experiencing a temporary decline in income ought to borrow to maintain consumption and then pay back the loans in future periods once income recovers to more usual levels.

The most sophisticated statistical investigations of the hypothesis have examined individual household income and expenditures for a sample of the same households over a number of years. These have shown that households possessing substantial liquid assets do behave as permanent income consumers. Households without many liquid assets, however, often do not maintain their consumption in the face of a temporary fall in income. Some poorer households are evidently unable to borrow against future income, and their behaviour does not correspond to the predictions of the permanent income hypothesis.

Studies of the purchase of consumer durables also tend to find that households appear to discount future energy savings at a rate that exceeds the market riskless rate of interest. They are less willing to pay a larger initial purchase price for a more energy-

⁷³ In the menu cost model, the nominal rigidities are not irrational, but the motivation for activist monetary policy in such models is unclear. The assumption of universal monopolistic competition can be questioned. Furthermore, even if the economy were characterised by pervasive monopoly, it is unclear whether activist monetary policy would be the appropriate policy response. Actions specifically tailored to different industries may more effectively promote competition. For example, removing barriers to international trade, government monopolies, occupational licensing restrictions and so forth may be more effective at increasing competition and efficiency than broad non-discriminatory actions such as activist monetary policy.

⁷⁴ Households can borrow to buy a car or a house, but in both these cases the physical assets are used as collateral and can be seized if the household defaults on loan repayments. In a sense, households can in these cases be thought of as 'firms' investing in assets that are used to provide services that they 'sell' to themselves. Credit cards are the main form of unsecured consumer loans in a modern economy.

efficient appliance than the present value of the savings in energy costs would imply. This result is consistent with the model we have outlined because the model implies that the household discount rate would exceed the market riskless rate of interest.⁷⁵

The evidence on consumer durable purchases may also be consistent with the inability of households with low liquid assets to borrow against future income. Such households appear even less willing to purchase durables with a higher initial price than do households who are unlikely to face borrowing constraints.⁷⁶

The model of the real effects of monetary disturbances that has been sketched here is also consistent with the large role that banking difficulties appeared to play in the recent Asian crisis and in earlier crises such as the Great Depression of the 1930s or the depression of the 1890s. Another implication of the model is that the spread of credit cards in the United States in the 1990s may have stabilised the US economy by relaxing borrowing constraints on many households and allowing them to behave more like permanent income consumers.

5.2.6 *Lagged effects of money on prices*

The model sketched above can explain short-run real effects of monetary disturbances. It is less clear, however, that it can account for long lags from money supply changes to subsequent changes in prices. In order to do so, the model needs to be extended to allow for multiple, partially interconnected, goods and services markets all using the same monetary standard.

Models of the macroeconomy typically make the simplifying assumption that there is just one representative goods market, one representative asset market, one representative labour market and so on. The implicit assumption appears to be that allowing for multiple markets would enable us to account for relative price movements and relative output movements, but would not give us any different behaviour at the aggregate level.

In Hartley (1990) we present a simple general equilibrium model in which there are no nominal rigidities, no banks or borrowing constraints and no unanticipated money supply shocks, yet average nominal prices adjust to a money supply increase with a lag. Furthermore, the prices that do adjust in the short run over-adjust relative to their long-

⁷⁵ There may, however, be other explanations. For example, people may expect that a disproportionate number of the second-hand appliances that are offered for sale are of low quality. If so, second-hand prices may not adequately reflect the expected future savings from more energy-efficient appliances.

⁷⁶ The model may also help explain the equity premium puzzle posed by Mehra and Prescott, 1985. This can be characterised as the observation that investors apparently need to be extremely risk averse to explain the differential in the returns on the real value-weighted New York Stock Exchange portfolio relative to three-month Treasury bills. Our model implies that the riskless interest rate is below the household rate of time preference. In addition, risky assets may have an additional risk premium that is not measured in the Mehra and Prescott framework. Households become very risk averse toward any income fluctuation that could leave them in a situation in which the borrowing constraint becomes binding.

run values. Thus, we obtain an overshooting result analogous to that found in models with nominal rigidities, but in our model there is no such irrational behaviour.⁷⁷

There are a number of critical assumptions needed to obtain the above result. The most important assumption is that the economy consists of many markets that interact with each other in a limited way. The market from which a person buys typically differs from the market to which that person sells. This is the 'double coincidence of wants problem under barter' that provides one explanation for the usefulness of money. Furthermore, we need to assume that there is no person who participates actively as a buyer or seller in all markets at the same time.⁷⁸ The final critical assumption is that a money supply change initially affects only a limited number of markets.

Consider the effect of a money supply increase in such an economy. The 'new money' has to be willingly held by people trading in the market that first receives it. Typically, the initial boost in spending will be concentrated on only a small part of the economy. This will require that prices in such markets make a greater than proportionate adjustment to the money supply increase. People trading in the market that first receives the new money will realise, however, that their local prices will subsequently decline as that money spreads to other markets. They will have an incentive to delay spending the new money balances in order to take account of this anticipated price decline. Some of the new money injected into the economy will thus be hoarded by the initial recipients.

The average level of nominal prices in the economy will rise only in proportion to the 'active' money supply being used to finance spending. The fraction of the money supply that is hoarded will not affect prices. In subsequent periods, the hoarded balances are spent as money spreads from the initial markets where it is placed into markets elsewhere in the economy. As the hoarded balances are spent, the average level of nominal prices rises. Eventually, all nominal prices rise in proportion to the money supply increase, but the process takes time. In the interim, prices in markets initially affected by the money supply overshoot their long-run values.

The gold rushes in Australia and California from 1849 to about 1860 may illustrate the process. At the time, the world monetary system was based on gold, so the increased supply of gold should have raised nominal prices throughout the world above what they were initially. For this to happen, however, the gold needed to get from the gold fields into Europe and elsewhere. The gold discoveries initially raised prices on the gold fields far above their long-run equilibrium values. The higher prices encouraged the importation of goods to the gold fields, paid for by a net export of gold. As the gold flowed out to other locations, prices there rose and prices on the gold fields tended to fall. Some people would have an incentive to delay the exchange of gold for goods in order

⁷⁷ Additional formal modelling is needed to combine the model of lagged adjustment discussed in this section with the banking model discussed in the previous section. The lagged price adjustment in the model discussed here is unconnected with any real effects of a money supply change and reflects different economic forces.

⁷⁸ As Hayek (1976) observes, socialism founders on the problem that there is no one person, or government organisation, who could possibly know, let alone successfully utilise, the mass of detailed and local knowledge upon which millions of daily economic transactions rely.

to get a better price. For example, miners from Bendigo would travel to Melbourne or further beyond before exchanging their gold for goods. The changes in relative prices between the gold fields and the remaining parts of the economy are a necessary part of getting the gold redistributed around the system.

The model sketched here is closely related to the description Hume gave ('Of Money', 1752) of the short-run effects of a change in the money supply:

[W]e must consider, that though the high price of commodities be a necessary consequence of the encrease of gold and silver, yet it follows not immediately upon that encrease; but some time is required before the money circulates through the whole state, and makes its effect be felt on all ranks of people. At first, no alteration is perceived; by degrees the price rises, first of one commodity, then of another; till the whole at last reaches a just proportion with the new quantity of specie which is in the kingdom ...

When any quantity of money is imported into a nation, it is not at first dispersed into many hands; but is confined to the coffers of a few persons, who immediately seek to employ it to advantage ... If workmen become scarce, the manufacturer gives higher wages, but at first requires an encrease of labour; and this is willingly submitted to by the artisan, who can now eat and drink better, to compensate his additional toil and fatigue. He carries his money to market, where he, finds every thing at the same price as formerly, but returns with greater quantity and of better kinds, for the use of his family. The farmer and gardener, finding, that all their commodities are taken off, apply themselves with alacrity to the raising more; and at the same time can afford to take better and more cloths from their tradesmen, whose price is the same as formerly, and their industry only whetted by so much new gain. It is easy to trace the money in its progress through the whole commonwealth; where we shall find, that it must first quicken the diligence of every individual, before it encrease the price of labour.

There is one major difference between the model we are proposing and the idea that Hume is presenting. For Hume, the lag in the price changes associated with a money supply increase is necessarily linked to the short-run real effects of the money supply change. By contrast, in the model we discussed above, average nominal prices can adjust to a money supply increase with a long lag even if the money supply changes have no short-run effects on aggregate output or employment.

Although both Hume and Keynes linked the short-run real effects of a money supply change to the lag in its effects on nominal prices and wages, there is no necessary reason for such a link. The banking model that was presented in the previous section does not require sluggish adjustment of average nominal prices in order for money supply changes to have real effects. The decentralised markets model discussed in this section does not require money supply changes to have short run-real effects in order to explain a lagged adjustment of average nominal prices to a money supply change.

However, the short-run real effects of money supply changes and the lagged response of average nominal prices to a change in the money supply may, in practice, arise from the same source. Both may occur because money supply changes in a banking economy have an initial impact highly concentrated on the banking sector and financial markets.

By altering the supply of base money, the central bank may, in the first instance, affect the balance sheet position of the banks. The banks purchase additional assets issued by firms

(that is, they extend new loans) and in doing so tend to drive up asset prices (that is, drive down interest rates). As borrowers spend the additional funds coming from the banks, the new money spreads to other markets and raises prices there. As the new funds spread to other markets, the supply of loanable funds from the banks declines and borrowers will again become willing to pay higher interest rates for bank loans. Anticipating this, banks will not loan out all the new funds in the first period, but will hold back some in anticipation of getting a higher return. Some of the money initially injected into the economy via monetary policy is thus hoarded in the short run.

As prices elsewhere in the economy begin to rise, the demand for transactions balances also rises. Some of the new base money will be held as cash and, as the demand for bank deposits rises, some will be held as higher reserves. Reductions in interest rates on inside money balances may also stimulate the demand for cash, as will any increase in real output resulting from the increased stimulus to investment.

The change in base money supply will eventually spread around the economy in a way that leads all nominal variables to increase in proportion to the money supply expansion, while leaving all interest rates and real variables unchanged. In the meantime, the money supply expansion has substantial real effects.

The model just described can explain a number of phenomena that otherwise would be difficult to explain. First, the link between changes in the monetary base and other variables may be weak because the amount of the base that is hoarded may vary from one episode to the next. In a sense, the relevant economic variable is the 'active' part of the money base, that is, the total amount minus the hoarded balances. By contrast, because changes in inside money components of the overall money supply are closely related to changes in bank lending, the substantial evidence tying the real effects of money supply changes to changes in inside money components may not be surprising.

Second, the model can explain why different money supply episodes can have very different patterns of real effects. The precise way that the new money spreads around the economy is likely to depend on where the new money is initially placed. For example, open market operations may affect bond and equity markets in the first instance. Foreign exchange market intervention may have a greater effect on traded goods industries. Changes in bank reserves, or the interest paid on bank reserves, may be a greater stimulant to bank lending. The effects of the money supply change may also depend on which firms happen to have investment projects that are more responsive to a decline in interest rates at the time of the expansion.

Third, there is statistical evidence that business cycles are asymmetric, with downturns being sharper and of shorter duration than business cycle expansions. The model can account for such a phenomenon, because the change in the hoarding of base money is likely to be more pronounced for monetary expansions than for contractions. Thus, while reducing the supply of base money is likely to reduce bank lending immediately, increasing the money supply will affect the rest of the economy with a longer lag.

Finally, the model is consistent with the observation that money supply shocks tend to have fewer real effects as average rates of inflation increase. Economies with higher

average rates of inflation also have more variable inflation rates. Extremely large and frequent increases in monetary growth rates cease to have real effects because suppliers stop responding to demand signals regardless of their origin.

5.2.7 *Bank runs and lender of last resort*

Since banks do not hold 100 percent reserve backing for their liabilities, a bank may be short of liquidity if many customers decide simultaneously to withdraw funds or make payments. The connectedness of the banking system may result in financial intermediation being affected by an externality. If one bank does not have sufficient base money to fulfil its commitments, people may doubt the ability of other banks to do likewise. Such a fear might be based on a mistaken belief because people do not have perfect information about the solvency of different banks. However, it might also reflect a well-informed assessment of the situation. The difficulties of the first bank may force it to call in loans from its borrowers. The borrowers may then be forced to sell assets at a discount and default on contracts with other firms, which in turn may have difficulty meeting loan repayment commitments with their own banks. As the crisis spreads from one bank to the next, people have an incentive to be the first in line to demand cash in exchange for their deposits. In short, a 'bank run' might develop.

'Illiquidity' should not be confused with 'insolvency'. A bank that is solvent, in the sense that it has assets sufficient to cover its liabilities and even to pay a profit to its shareholders, may nevertheless be illiquid in the sense that it has insufficient base money to fulfil its commitment to liquidate its deposit liabilities on demand. A market in which banks lend reserves to each other can help alleviate the liquidity problems of a single bank. The externality argument suggests, however, that the central bank may have a role as a lender of last resort if many banks are believed to be temporarily illiquid, even if they are solvent. The banking system as a whole will need more reserves, and the demand for base money will rise, if many people simultaneously come to doubt the ability of their banks to provide cash in exchange for deposits and rush to withdraw the limited cash that is available.

As the sole issuer of base money, the central bank may be critical to alleviating a bank run. Only the central bank can provide the additional base money the economy will need if many people decide to replace inside money deposits by currency. The central bank could expand the supply of base money to accommodate the increased demand by taking the illiquid assets of the banks as collateral for loans of base money. So long as the banks really are solvent, they would be able to pay a market rate of interest for the base money loan. A commercial bank that is not willing to pay the market rate of interest on such a loan could be presumed to be insolvent and should be allowed to fail.⁷⁹

⁷⁹ Whoever performs the lender of last resort function may also need to perform a prudential or supervisory role, just as fire insurance companies inspect the premises of their customers to guard against moral hazard. Supervision by the central bank is less essential if the central bank is restricted to providing liquidity in an emergency. The banks could devise their own arrangements for supervising the market for exchanging reserves just as they would be left to arrange their own deposit insurance scheme.

The issue is not, however, as straightforward as this analysis would suggest. Information difficulties that could lead to a run on banks that may, with hindsight, be unjustified could be exacerbated by providing lender of last resort facilities. If depositors thought they could rely on benefiting from lender of last resort activities, they would have a reduced incentive to monitor the lending activities of their banks. Leaving some doubts about the circumstances under which a central bank would provide lender of last resort services therefore might usefully encourage depositors to monitor the lending activities of their banks more carefully.

5.3 Inflation and interest rates in an open economy

In a small trading economy such as New Zealand, interactions with the rest of the world strongly influence economic developments within the country. Movements in the 'terms of trade', or the ratio of export prices to import prices, affect the gains from trade and, hence, overall economic prosperity.

Interactions with other economies can also affect the extent to which the Reserve Bank of New Zealand can control monetary conditions. For example, there is a limit to the extent to which foreigners wish to accumulate New Zealand monetary assets (direct or indirect claims on New Zealand base money). The demand for such assets would be limited primarily to foreign residents engaged in trade with New Zealand firms or wishing to invest in New Zealand assets. If the Reserve Bank of New Zealand neither buys nor sells foreign currency, the exchange rate of the New Zealand dollar will be determined so that the New Zealand balance of payments deficit or surplus matches the desire of foreign residents to accumulate or decumulate New Zealand monetary assets. In particular, the exchange rate is said to float freely if no official agency, including the central bank, is buying or selling foreign exchange in order to influence the exchange rate. The balance of payments will generally be close to zero and current account deficits need to be financed by foreign borrowing, or a capital account surplus.⁸⁰

5.3.1 *Types of exchange rate regimes*

The foreign exchange rate regime chosen by New Zealand has a critical effect on how developments both within New Zealand, and also in the rest of the world, influence the New Zealand economy. There are essentially three options available to New Zealand.

The first option is that New Zealand could simply use the monetary assets of some other country, as it did before the New Zealand currency was disassociated from pounds sterling. This does not require New Zealand to run a separate monetary policy. As discussed above, however, there may be a need for some entity in New Zealand to provide lender of last resort services in the event of a bank run. The foreign central bank

⁸⁰ In contrast, the United States can run a substantial balance of payments deficit even if the US dollar is allowed to float freely. Many foreign central banks, firms or individuals accumulate US monetary assets for transactions purposes. The market value for the US dollar will typically result in excess supply of the US currency, or a US balance of payments deficit.

that issues a base money that New Zealand is using might do nothing to alleviate a bank run in New Zealand.

The second option is to maintain a fixed exchange rate between the New Zealand dollar and some other currency, or a basket of currencies. The Reserve Bank of New Zealand would stand ready to buy or sell New Zealand dollars at the fixed rate. In order to do so, the Reserve Bank needs to hold a portfolio of foreign exchange assets. As the Reserve Bank intervenes in the foreign exchange market there will be surpluses or deficits in the balance of payments.

The Bretton Woods regime, which lasted from 1945 to 1971, required all countries other than the United States to maintain a fixed exchange rate with the US dollar.⁸¹ The regime also allowed countries to run their own domestic monetary policy, however, and to adjust the so-called fixed exchange rate from time to time. As a country expanded its base money supply, the value of the domestic currency tended to fall. The central bank was then obliged to use its foreign exchange reserves to support the exchange rate. As investors came to believe that the central bank would run out of reserves, or would devalue the exchange rate before doing so, there was a huge incentive to speculate against the bank. Investors would move funds offshore, wait for the devaluation, and then move the funds back at a profit. The large demand for foreign currency resulting from such speculative capital flows in turn exacerbated the problems confronting the central bank and made the devaluation more likely. In short, the combination of a periodically changing exchange rate with an independent domestic monetary policy created an unstable system. Virtually no economists now advocate returning to such a system, and we therefore have not discussed it as a realistic possible alternative institutional framework for New Zealand.

Following the collapse of the Bretton Woods system, most countries eventually moved to the third exchange rate option, namely floating exchange rates. Exchange rates in the floating rate era have been affected by varying degrees of intervention by central banks.

Under a clean, or free, float the central bank does not intervene in the foreign exchange market.⁸² The foreign exchange value of the currency equates the supply, arising from exporters or investors borrowing abroad, with the demand, arising from importers or investors wishing to purchase foreign assets. Unless foreign residents wish to accumulate direct or indirect claims to New Zealand base money, a current account deficit has to be offset by a capital account surplus, or net foreign borrowing.

⁸¹ The United States was supposed to maintain a fixed rate of exchange between the US dollar and gold. In the late 1960s, the US government expanded substantially domestic spending while it was also fighting the Vietnam war. The resulting large budget deficits were monetised by the US Federal Reserve, perhaps because it was targeting interest rates. The US balance of payments deficits exceeded the growth in demand for US dollars as an international medium of exchange. Foreign central banks purchased dollars in order to maintain their exchange rates. The United States had far too little gold to fulfil its commitment to exchange dollars for gold at the agreed rate of exchange. Eventually, France demanded gold in exchange for its dollars and President Nixon closed the gold window on 15 August, 1971.

⁸² The bank may retain some foreign reserves and the capability to intervene in the market 'in extreme circumstances' without influencing the rate on a daily basis.

Under a dirty float, the central bank maintains substantial reserves of foreign exchange assets and regularly intervenes in the foreign exchange market to influence the foreign exchange value of the currency. If the domestic currency would devalue without central bank intervention, the domestic currency must be in excess supply in the market and the central bank must be selling foreign currency to maintain the rate. Just as with the so-called fixed rate regime discussed earlier, this creates the potential for substantial instability. If private investors are aware that the central bank is selling its foreign exchange assets, they may believe that the bank will run low on reserves and will have to allow the exchange rate to devalue. Speculators then have an incentive to buy foreign assets and wait for the devaluation, an act that will, in itself, make the predicted devaluation more likely.

If a central bank does intervene in the foreign exchange market by selling foreign currency, its assets will decline, but so will its liabilities because buyers of the foreign currency will use bank liabilities (notes or bank reserves) to finance their purchase. The exchange market intervention will thus tend to reduce the domestic money base below what it would otherwise have been. If the central bank simultaneously buys domestic government bonds to leave the base unchanged, the combined action is known as a 'sterilised intervention'.

Obviously, these policies could all be run in the opposite direction. The central bank could buy foreign exchange to prevent the domestic currency from appreciating. In doing so, the bank would automatically tend to expand the domestic money base, with the 'new money' accruing, in the first instance, to traders in the foreign exchange market. A sterilised intervention now would require the central bank to sell government bonds, with the result that bond traders would experience a decrease in liquidity.

Many officials who have had experience with the daily operation of monetary policy believe that sterilised interventions can affect interest rates, exchange rates and other economic variables. Economists used to thinking in terms of the standard macroeconomics model tend to be sceptical of such claims. In the standard macroeconomic model, an economy that in reality consists of a huge number of markets connected imperfectly with each other through common buyers or sellers, is characterised by a representative money market, a representative bond market, a representative goods market and a representative labour market. Because the focus is on interactions between markets, the representative markets within the model are assumed to interact continuously and instantaneously. The way the money supply is changed in such a world has no effect. However, in the banking model with many markets that we discussed above, sterilised intervention could have real effects. The people gaining liquidity under a sterilised intervention are not necessarily the same people suffering a decline in liquidity. A sterilised intervention may, thus, have to alter relative asset prices, and perhaps other relative prices too, in order to redistribute base money across the various markets.

5.3.2 *Purchasing power parity*

If purchasing power parity holds, the goods and services that can be purchased with a given quantity of money are independent of the currency in which the money is denominated. The exchange rate between the two currencies ought to compensate for the differences in the prices of the goods and services when expressed in each currency.

Purchasing power parity is related to, but distinct from, another claim known as the 'law of one price'. This law states that the price of a traded commodity in two countries cannot differ by more than the transactions costs of buying the good in one country and selling it in the other, plus the costs of transporting the commodity between the two countries. The law of one price is an 'arbitrage condition'. If it did not hold, profits could be earned by arbitraging between the two markets.

Purchasing power parity is based on the quantity theory of money, not the absence of arbitrage profits. As explained above, the quantity theory of money implies that a given percentage increase in the base money supply will, in the long run and in the absence of any other changes, produce an equivalent percentage increase in the level of all nominal prices. In particular, the CPI, or any other index of nominal prices, will then increase by the same percentage amount as the base money supply. The domestic currency cost of all foreign currencies will also increase by that same percentage amount. The domestic currency will thus devalue⁸³ by an amount that offsets the nominal price increases when measured in any foreign currency. If the quantity theory of money holds, therefore, the purchasing power of a domestic currency is unaffected by a change in the domestic money base.

Purchasing power parity is not an arbitrage condition. Although one could purchase all the goods and services that make up a diversified price index in one country, that bundle could not be transported and exchanged for the corresponding bundle of goods and services that constitute the price index in the other country.

One impediment to arbitraging divergence from purchasing power parity is that not all the goods and services that are part of diversified price indexes, such as the CPI, are traded. More than that, however, some goods that appear to be traded are in fact not entirely so. For example, automobiles are traded but the models sold in different countries are not exactly alike. Local safety and environmental standards often differ, while differences in fuel costs, road conditions, distances travelled and so on also affect the characteristics of vehicles that consumers wish to buy. In addition, the retail price of an automobile reflects the price of an implicit insurance contract (the vehicle warranty) that is bundled with it. The characteristics, and the costs of supplying these implicit insurance contracts differ across countries. More significantly, warranties on new vehicles are non-traded goods both within a country (one cannot buy a separate warranty) and between countries. The retail price of an automobile will also reflect other non-traded components such as transport costs within a country, advertising costs, the

⁸³ By convention, exchange rates are measured as the domestic currency price of a unit of foreign currency so a devaluation corresponds to an increase in the exchange rate.

wages of sales agents and so on. Thus, even the law of one price could not be expected to hold with respect to such apparently traded goods as new vehicles. It applies only to the landed prices of bulk commodities or raw materials that are traded in a very similar form in all countries.

Because purchasing power parity is an implication of the quantity theory of money, we could not expect it to hold with any greater accuracy than other implications of the quantity theory. In particular, we noted above that the quantity theory is a long-run concept. It does not apply to lags of one or two years from an initiating money supply change, but appears as data are averaged over longer periods. The difference in the inflation rates between two countries can deviate substantially from the exchange rate change for some time following a money supply change.

It is also important to note that purchasing power parity is supposed to follow only from money supply changes. Real shocks could not be expected to produce offsetting movements in relative inflation rates and the exchange rate. For example, the inflation rates in Hong Kong have exceeded those in the United States by several percentage points per year since Hong Kong adopted the US dollar as its currency. The purchasing power parity theory would imply that, because the exchange rate has not changed, the inflation rates ought to be the same. Hong Kong has, however, had a higher rate of productivity growth over this period. This has been reflected in an increase in real wages in Hong Kong relative to the United States, and thus an increase also in the relative prices of non-traded products, or product components, that include Hong Kong labour inputs.⁸⁴

The rising relative productivity of labour in Hong Kong could, in principle, be offset by a change in migration between Hong Kong and the United States instead of a difference in inflation rates. Restrictions on migration rule out this avenue of adjustment in practice. The case of Ireland shows, however, that even where there are fewer restrictions on migration, a common currency does not eliminate differentials in inflation rates. The higher growth rate of the Irish economy in recent years, relative to other countries in the common European currency area, has meant that Ireland also has experienced a higher rate of inflation.

By analogy with Hong Kong and Ireland, countries such as New Zealand, Australia and the United States often exhibit regional disparities in inflation rates. As the demand for real estate rises in Auckland relative to the rest of New Zealand, in Sydney relative to the rest of Australia, or California relative to the rest of the United States, land prices and rents rise in these regions. The increased demand to live in a region raises the productivity of land in that region. It, therefore, also raises the relative prices of goods that are intensive in the use of those land services. The cost of living, or CPI, rises in the more popular parts of the country relative to the less popular areas, even though all

⁸⁴ For traded commodities that are amenable to arbitrage, the fixed exchange rate between Hong Kong and the United States should fix the Hong Kong price. Such commodities could continue to be produced in Hong Kong despite the rising Hong Kong wage rates only because the prices of some other inputs (for example the rents on some inelastically supplied input) fall in Hong Kong dollar terms.

regions are using the same currency. Land is a non-traded input, just as labour services are non-traded between Hong Kong and the United States, and only imperfectly traded between Ireland and continental Europe.

5.3.3 Covered interest arbitrage

We noted that the law of one price follows from the absence of arbitrage profits in goods markets. Similarly, international capital markets are related by a 'covered interest arbitrage condition'. This says that the forward premium⁸⁵ on a foreign currency has to equal, to a close approximation, the interest rate on a domestic government bond of the same maturity as the forward contract, minus the interest rate on an equivalent bond denominated in the foreign currency.

The covered interest arbitrage condition implies that the forward exchange rate is determined by arbitrage between the domestic and foreign bond markets and the forward and spot foreign exchange markets.⁸⁶ Consider an investor contemplating investing in a domestic government bond that will be held to maturity. The principal could instead be converted to a foreign currency at the current spot exchange rate, invested in a foreign government bond that matures at the same date as the original domestic bond, and the foreign exchange proceeds sold forward at the current known forward rate. A riskless arbitrage opportunity is available if one of these strategies yields a higher return than the other. Because money ought not to be left lying on the table in an efficient financial market, the two strategies ought to yield the same return.

Statistical analyses have found only minor deviations from covered interest arbitrage. These deviations are consistent with the transactions costs that would be incurred in arbitraging between the two bond markets and the forward exchange market.

An implication of covered interest arbitrage is that the forward foreign exchange rate reflects primarily differences in interest rates rather than the expected future spot exchange rate. It might be thought that if the forward rate is systematically different from the future spot rate, a speculator could make profits by exploiting the differential. For example, suppose the forward rate tended to exceed the subsequent spot rate more often than it fell short of it.⁸⁷ The future depreciation of the currency that appears to be predicted by the forward rate tends, more often than not, not to be realised. A speculator could sell forward contracts on the domestic currency and expect, on average, to be able to close them out at a spot exchange rate that is below the rate specified in the forward contract.

⁸⁵ This is the difference between the forward rate and the current spot rate expressed as a percentage of the current spot rate.

⁸⁶ In an economy without a forward exchange market, the 'missing market' can thus be duplicated by simultaneous trades in the domestic and foreign bond markets.

⁸⁷ This begs the question as to what may be the underlying source of the forward rate bias. We examine this issue in more detail below. For the moment, we are merely concerned whether arbitrage alone could prevent such a bias from persisting.

Selling forward contracts on the domestic currency would tend to lower the forward price. Conversely, buying domestic currency in the future to close out the forward contracts would tend to raise the spot price of domestic currency at that time. Attempts to exploit a systematic bias in the forward rate as a predictor of the future spot rate will tend to move both forward and spot exchange rates to bring them in line with each other.

A speculator would not continue to sell contracts until all such expected profits disappeared, however, unless the speculator were risk neutral. To exploit an apparent pattern in the differential between forward and spot rates, the speculator needs to hold a risky position to maturity. The speculator may also make losses, even though profits may be expected on average. By contrast, the covered interest arbitrage trades discussed above can all be done today at known rates and involve no risks.

The expected return from exploiting a persistent bias needs to compensate the marginal risk averse speculator for the risk involved. For the expected profit from speculation to be positive, speculators need to expect the forward rate to be a biased predictor of the future spot rate.

5.3.4 *Interest rates, the exchange rate and the forward premium*

It may be illuminating to discuss interest rates and exchange rates in a very special case. Suppose:

- the quantity theory of money holds in the short run as well as the long run;
- only monetary shocks affect domestic economic aggregates;
- there are no taxes and no significant differences between the security of property rights in either the domestic or foreign economy; and
- there are no foreign shocks, so foreign prices and interest rates are constant.

Because the foreign inflation rate is zero by assumption, the foreign real and nominal interest rates would be equal. The domestic real interest rate would also be constant, while the domestic nominal interest rate would equal the real rate plus the expected rate of inflation. Purchasing power parity would also imply that the domestic inflation rate equalled the rate of devaluation of the domestic currency. Covered interest arbitrage would imply that the forward exchange premium equalled the difference between the domestic nominal interest rate and the foreign (nominal and real) interest rate. Thus, the forward premium would equal the difference in real interest rates plus the rate of devaluation of the domestic currency. Suppose investors can allocate capital to either economy and assume that capital is reallocated until real returns are equalised. The forward premium would then reflect the rate of devaluation of the domestic currency and would eliminate the risk of exchange rate movements. This would validate the assumption that capital would be reallocated until real returns are equalised, because investing in either economy would have the same risk.

This example highlights the special conditions needed before the forward foreign exchange market can eliminate the risks associated with volatile exchange rates. In reality, the forward premium will be affected by any factors influencing nominal interest

rates, not just changes in expected inflation rates. Furthermore, when purchasing power parity does not hold, variations in the spot exchange rate will deviate from the differential in inflation rates. As a consequence, the forward foreign exchange market will not insulate firms engaged in international trade in goods or assets from the effects of unanticipated fluctuations in exchange rates. An exporting or importing firm, for example, could use the foreign exchange market to ensure today a known New Zealand dollar value of a future transaction. The New Zealand dollar equivalent of prices denominated in foreign currencies will nevertheless tend to fluctuate over time much more than domestic New Zealand prices.

The problem arises not only from the fact that real shocks, such as changes in productivity, have important effects on the economy. The short-run effects of base money supply changes discussed previously also have important implications for the foreign exchange market. We noted above that money shocks are likely to affect asset markets first, and, in particular, will tend to produce an over-adjustment of asset prices in the short run. The fall in interest rates resulting from a money supply expansion, or rise resulting from a money supply contraction, is the so-called 'liquidity effect' of a money supply change. The foreign exchange market similarly tends to be affected early on by a money supply change. The spot exchange rate, thus, also tends to over-adjust in the short run.

To be concrete, consider an increase in the level (but not the rate of growth) of the domestic money base resulting from a central bank purchase of domestic bonds. The reader may find the discussion of the likely consequences easier to follow by examining the idealised representation in Figure 5.3. The upper left panel in Figure 5.3 graphs the price level, the lower left the inflation rate, the upper right the nominal interest rate and the lower right the exchange rate, each as a function of time.

In the long run, the quantity theory of money implies that a domestic money supply expansion will proportionally increase all domestic nominal prices (including the price level P , the exchange rate⁸⁸ s and bond prices) and leave real variables unaffected. In particular, purchasing power parity (a special case of the quantity theory) implies that the domestic exchange rate will 'ultimately' devalue in proportion to the money supply expansion (thus, s^* in Figure 5.3 exceeds the initial value of the exchange rate s_0).

In the short run, the exchange rate overshoots the long run devaluation. In Figure 5.3, s jumps immediately to a level beyond s^* upon announcement of the open market operation. The foreign exchange market, like stock and bond markets, reacts immediately to news. The exchange rate s then gradually revalues back to its long-run level as domestic goods and services prices rise. The likely adjustment path can be described as follows.

The initial money supply increase will reduce domestic interest rates. Immediately following the open market operation and concomitant increase in base money supply, domestic short-term interest rates will fall. This movement in interest rates is also known

⁸⁸ Recall that a 'rise' in the domestic currency price of foreign exchange corresponds to a 'devaluation' of the exchange rate.

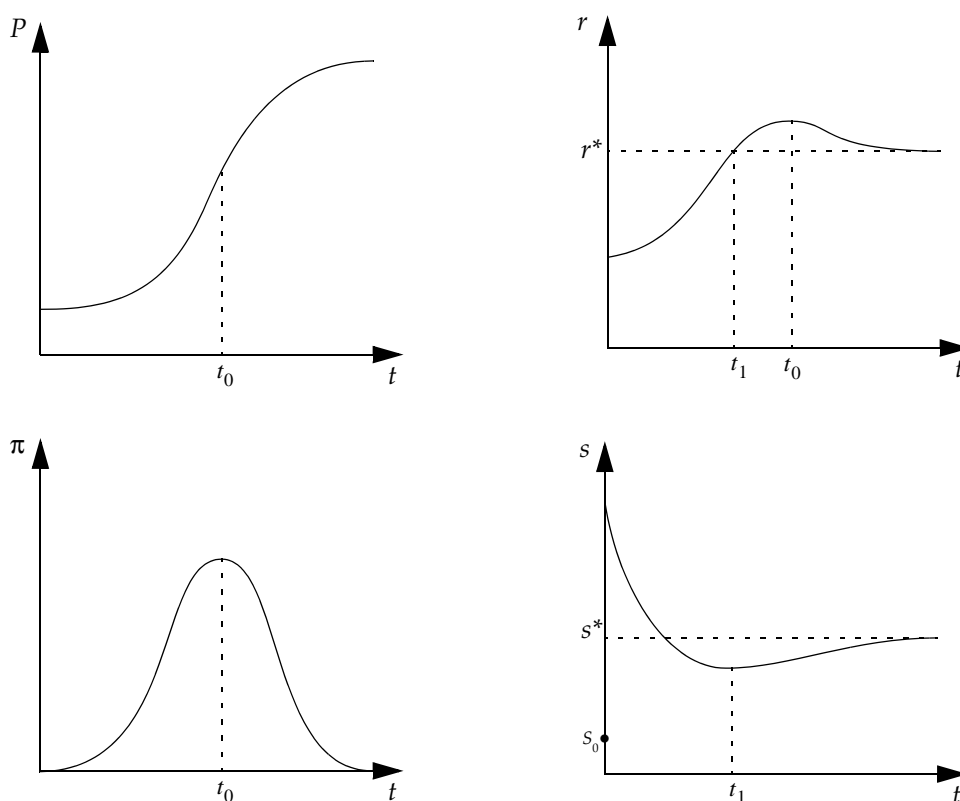


Figure: 5.3: Effects of an increase in the money supply level

as the short run 'liquidity effect' of a money supply change. Because the new money is initially injected only into domestic bond markets, prices in those markets will need to rise more than proportionally to the money supply increase if people are to hold the new money balances willingly. Domestic short-term real interest rates will thus tend to fall substantially below their long-run value, r^* , as a result of the monetary expansion. It is partly the fall in these rates that stimulates borrowing and spreads the new money to other markets in the economy.

Because covered interest parity has to hold, foreign investors in New Zealand bonds need to expect an appreciation in the New Zealand exchange rate over the term to maturity of short-run domestic bonds. The anticipated appreciation needs to be large enough to offset the lower New Zealand interest rates and ensure an unchanged return measured in foreign currency units.⁸⁹ The only way a foreign investor could expect to see an intermediate-run appreciation, and long-run proportional depreciation, of the New Zealand exchange rate is if the depreciation upon announcement of the money supply increase goes beyond the long-run level, s^* , as illustrated in Figure 5.3.

⁸⁹ As discussed in the above section on 'asymmetric impacts of monetary policy', domestic investors are willing to accept a lower return on domestic bonds because their alternative is holding cash balances in excess of their transactions needs. These excess balances yield an even lower explicit rate of return than do domestic bonds. Domestic bond prices need to be bid up to the point where the explicit interest yield on those bonds less the anticipated capital loss as bond prices subsequently fall matches the implicit liquidity yield on cash balances.

The tendency for the foreign exchange rate to overshoot its long-run target in the short run can be described in another way. Foreign exchange rates tend to over-adjust (devalue more than proportionally) in the short run because all asset markets quickly feel the effects of new money entering (or leaving) the bond markets. Markets for many types of assets, including equity, real estate, bonds and foreign exchange, are linked through arbitrage by commercial banks and other professional investment firms. Short-run price increases in all types of assets will accommodate the initial monetary expansion and thus will tend to adjust more than proportionally to the money supply increase in the short run. Asset prices will then re-adjust back to an increase that is proportional to the percentage change in the money supply in the long run as nominal prices elsewhere in the economy increase.⁹⁰ Thus, a money expansion will, in particular, engender a devaluation of the domestic currency that goes beyond where the exchange rate is likely to end up in the long run.

The covered interest arbitrage condition also explains the remaining patterns in the time paths graphed in Figure 5.3. Observation of the money supply increase will raise inflationary expectations for the intermediate term. The time of maximum goods and services price inflation is labelled t_0 in Figure 5.3. It will take time before the new money injected initially in the bond markets finds its way into markets for other goods and services, and so it will also take time for the general price level to rise. The higher intermediate rate of inflation will tend to increase intermediate-term nominal interest rates as domestic investors demand higher nominal interest rates to compensate for the higher inflation. In Figure 5.3, we have assumed that domestic nominal interest rates rise slightly above their long-run equilibrium value of r^* from period t_1 on. This is not the only possible adjustment path, but it is an instructive one to examine. If domestic interest rates do rise above r^* , foreign investors would need to anticipate a devaluation of the exchange rate if they are to remain indifferent between holding New Zealand and foreign bonds. In this case, therefore, the exchange rate would initially devalue precipitously to a value beyond its long-run value s^* , then revalue back gradually to a value below s^* , only to devalue slightly again from period t_1 on before ultimately attaining its new long-run equilibrium value of s^* .

In the longer term, the inflation rate would be expected to subside to zero again as domestic nominal prices reach their new, higher, long-term values. The domestic interest yield curve⁹¹ will thus tend to steepen at the low end and flatten at the long end.⁹²

⁹⁰ The short-run overshooting of asset prices following a monetary expansion could also be thought of as an example of the Le Chatelier principle. When fewer variables are free to adjust to a shock, those that can adjust will tend to adjust more than will be the case in the long run when much more is variable. The same idea applies to short-run and long-run marginal costs of production. As more inputs become variable, output can be increased by a given amount at lower cost.

⁹¹ The yield curve is a plot of implied annual yield on a zero coupon government bond against the term to maturity of the bond. The implied annual yield of a bond with a face value of F , a term to maturity of T years and a market price of P is $(F/P)^{1/T} - 1$.

⁹² A normal yield curve is upward sloping. Because the prices of long-term bonds change whenever market interest rates change, long-term bonds are more risky than short-term bonds. Thus, even if short-term interest rates were expected to remain constant, the yield to maturity on a long-term bond would exceed that constant short-term rate.

We can also ask how the forward exchange rate will move throughout the adjustment process. As a result of covered interest arbitrage, the forward premium will equal the difference between New Zealand and foreign interest rates. Suppose that the domestic and foreign yield curves were identical before the domestic money expansion. The forward premium would thus be zero at all time horizons. A domestic money expansion then reduces domestic interest rates at shorter time horizons and covered interest arbitrage requires a negative forward premium. The forward exchange rate at short time horizons thus tends to under-adjust to the large devaluation in the spot exchange rate. In other words, the forward rates under-predict the eventual spot rates. At an intermediate time horizon, domestic nominal interest rates may rise above their foreign counterparts. If this happens, covered interest arbitrage would imply that the forward premium is positive for intermediate horizons, and the forward rate for those horizons would rise above even the depreciated current spot exchange rate. The long-term forward premium would, however, be close to zero as domestic and foreign long-term interest rates remain at their initial levels. In this example, therefore, the forward rate tends to under-predict spot exchange rates in the short run and over-predict them at intermediate and longer time horizons.

A domestic monetary contraction tends to cause the opposite set of effects. The exchange rate will ultimately revalue upward against foreign currencies, but the movement will be exaggerated in the short term. Real interest rates will tend to rise in the short run, choking off investment and bank lending. The forward exchange rate will again tend to under-adjust to the revaluation in the short run, and over-predict the revaluation in the long run.

Although a domestic money supply change affects ultimately only nominal prices and no real variables, in the short term it causes considerable disruption to the economy. Resources are encouraged to move between the traded and non-traded goods sectors of the economy and between sectors more or less sensitive to interest rate changes.

In summary, when domestic money supply shocks predominate, spot exchange rates tend to over-adjust to domestic money supply shocks in the short run, while forward exchange rates tend systematically to under-predict exchange rate changes in the short run and over-predict them in the long run. These tendencies are one reason economists have become more critical of floating exchange rates in recent years. This has not, however, produced a strong desire to return to the Bretton Woods system. That system of quasi-fixed exchange rates and independent domestic monetary policies suffered from inherent instabilities. Monetary unions, currency boards and dollarisation are seen as ways of fixing exchange rates while avoiding some of the problems associated with the Bretton Woods system. Another response, however, may be that floating exchange rates have not been the source of short-run instability. Rather, domestic monetary policy has remained too variable. What may be needed are further constraints on monetary activism, not an abandonment of the floating foreign exchange rate regime.

5.3.5 Currency risks

Large fluctuations of exchange rates are likely to increase the risks of foreign investment. The mere existence of exchange rate uncertainty need not imply, however, that real interest rates on New Zealand government bonds, for example, will exceed real interest rates on comparable United States government bonds denominated in US dollars. It is possible that exchange rate risks could reduce real interest rates in New Zealand. There are two critical factors determining whether New Zealand dollar assets bear a currency risk. The first is whether the New Zealand economy is running a capital account surplus (current account deficit)⁹³ or a capital account deficit (current account surplus). The second factor is whether the risks of currency fluctuations vary systematically with the return on a diversified portfolio of internationally traded assets. Let us examine each of these influences in turn.

When New Zealand is a capital importer (running a capital account surplus), the marginal investor in New Zealand government debt (or a close substitute) is a foreign resident. The economy is, in effect, exporting financial assets (bonds or equities) to the rest of the world. If there are any systematic risks associated with exchange rate changes, they are analogous to the costs of transporting goods to foreign markets. In the case of exported goods, the domestic price in the exporting country equals the world price less the transport costs. Similarly, the bond price in a bond exporting country should equal the world price minus any relevant 'currency risk discount', which is a cost of making that asset available to foreign investors. A lower bond price corresponds to a higher domestic real interest rate. Conversely, the bond price in a country running a capital account deficit, and thus purchasing foreign bonds or equities, will equal the world price plus any relevant currency risk premium. A higher domestic bond price corresponds to a lower domestic real interest rate.⁹⁴

Whether or not there are any systematic risks associated with exchange rate changes depends on the 'covariation' between the returns on New Zealand government bonds 'expressed in foreign currency' and the returns on a diversified world portfolio 'expressed in the same currency'. In principle, the relevant currency for determining risks would be the currency used by the marginal exporter of savings to the world capital market.⁹⁵

For concreteness, let us suppose the marginal investor is Japanese. The return on a New Zealand government bond for that investor would depend not only on the coupon on the bond but also on fluctuations in the exchange rate between the New Zealand dollar and

⁹³ If exchange rates are allowed to float freely, and foreign stocks of the domestic currency do not change, the balance of payments must be zero. A country running a capital account surplus must therefore also be running a current account deficit.

⁹⁴ Nominal interest rates will also vary from one country to another if inflation rates differ. The argument presented in this paragraph was implicitly taking inflation rates in the two economies as identical.

⁹⁵ The words 'in principle' are added because it is difficult to know where the marginal investor lives, while the location of that person could vary over time. We know of no attempt to measure the relevant covariance for any currency.

the Japanese yen. The investor could diversify some of these risks by holding other assets that tend to have lower yen returns when New Zealand government bonds have higher yen returns. The systematic risk of each asset is the risk that remains after all opportunities for diversification have been exploited. That risk is measured by the covariation of the return on the asset in question with the return on a fully diversified portfolio of assets. If yen returns on the New Zealand government bond tend to be high when returns on the diversified portfolio are high and vice versa, this covariation will be positive.⁹⁶ Because New Zealand is a capital importing country, the positive currency risk premium would add to the return on New Zealand government bonds demanded by the 'marginal' investor (who by assumption is foreign).

It may be useful to consider this argument in the context of the covered interest arbitrage condition discussed above. Recall our argument that the forward premium has to equal the differential between domestic and foreign interest rates on otherwise equivalent assets. Again consider the case of the New Zealand dollar and the Japanese yen. For simplicity, let us assume that although the exchange rate varies randomly, it has no trend. We could extend the argument to allow for a trend resulting from a permanent differential in inflation rates. In order to isolate the currency risk effect from factors such as default risk, suppose that there are two otherwise identical New Zealand government bonds, but one has its face value and coupon payments denominated in yen while the payments on the other bond are denominated in New Zealand dollars. Suppose there is systematic currency risk, so that the interest yield on the New Zealand currency bond permanently exceeds the interest yield on the yen bond. The forward premium for the exchange rate between the New Zealand dollar and the yen would also have to be positive. The forward rate would appear to predict a continuing depreciation of the New Zealand dollar relative to the yen even though the exchange rate has no trend by assumption. The forward exchange rate would appear to be systematically biased as a predictor of the expected future spot exchange rate. In order to exploit the apparent bias in the forward rate, however, a Japanese investor would need to buy New Zealand dollars forward with the intention of taking delivery at maturity and exchanging the proceeds for yen at that time. While the investor would expect to gain on average, there is a risk of the exchange rate being different from its expected value. The systematic element in the random exchange rate movements makes the investment risky. The expected 'additional' element in the return merely compensates the investor for bearing that systematic risk.

⁹⁶ It is theoretically possible that the systematic exchange rate movements for a particular currency could be negatively correlated with returns on a diversified global investment portfolio. In that case, the risk premium associated with that particular currency would be negative. It is also possible for interest rates at different time horizons to be affected differently by currency risk. For example, if the New Zealand dollar/Japanese yen exchange rate responds mainly to shocks to the level of the New Zealand base money supply, the currency risk premium may disappear at long time horizons. Speculators would expect purchasing power parity to hold in the long run with a high degree of confidence, reducing the risk of long-term speculative positions.

5.3.6 *The peso problem*

Political uncertainty can create another source of persistent bias in the forward exchange rate as a predictor of the future spot rate. The phenomenon goes under the name of the 'peso problem' because its most prominent manifestation was in the exchange rate between the Mexican peso and the United States dollar for long periods of time in the 1980s and 1990s. On a number of occasions in these decades, the Mexican government was attempting to maintain a fixed exchange rate between the peso and the dollar. Speculators believed, however, that the rate was unsustainable in the long run because the Mexican central bank was running out of foreign exchange reserves as it attempted to support the rate. The forward premium (and domestic interest rates in Mexico) reflected an expectation that the peso may be devalued in the near future. In the event, the exchange rate was held and the forward rate deviated from the subsequent spot rate. Eventually, the predicted devaluation occurred, but the forward rate appeared to be a biased predictor of the future spot rate for long periods of time.

The more general phenomenon is that there may be an asymmetry in the possible future values for the exchange rate. For example, suppose it is possible, but not likely, that a left-wing government will be elected that will markedly undermine monetary policies supporting price stability. Domestic interest rates and the forward rate may reflect the possibility of a large devaluation and concomitant increase in inflation. Both may appear biased when evaluated solely as predictors of the most likely exchange rate and inflationary expectations. As long as the adverse event does not occur, the forward rate will persist in being a biased predictor of the future spot rate. If the adverse event occurs, however, the future spot rate will turn out to be much weaker than that predicted by the earlier forward rate.

5.3.7 *Effects of currency risk premiums on New Zealand*

Private firms in New Zealand would have two risk components in their required rate of return. As with government bonds, there will be a currency risk associated with the fact that returns are expressed in New Zealand dollars while the marginal investor is a foreigner. In addition, there will be a 'real risk factor' associated with random fluctuations in the firm's revenues and costs. The risk premium associated with the latter would also be determined by the covariance of those net revenues with the returns on the diversified world portfolio. The latter risk factor, unlike the former, could not be eliminated by a fixed exchange rate with the currency that is used by the marginal foreign investor.

Lally (2000) uses a number of models to assess the real costs of capital in New Zealand, Australia and the United States.⁹⁷ He allows for a range of assumptions regarding the effects of taxes and the extent of integration of world capital markets. Lally argues that the real interest rate on New Zealand government bonds is about two percentage points higher than the corresponding rate in the United States. He suggests that one percentage

⁹⁷ The reader is referred to Lally's study for details of his analysis.

point of this is due to currency risk and should be eliminated if New Zealand used the US dollar as its currency.⁹⁸

Domestic real interest rates may also exceed foreign real interest rates as a result of what is sometimes called a 'country risk premium'. The premium would be more appropriately called a 'sovereign risk premium'. As a government accumulates debt denominated in domestic currency it may be tempted to induce a domestic inflation, and devalue the exchange rate, in order to reduce the real value of its obligations. Recognising these temptations, lenders are likely to demand nominal interest rates in excess of the current rate of inflation. Uncertainty about the future path of inflation when the government has substantial debt denominated in domestic currency may also lead investors to demand a risk premium, or nominal interest rate in excess of the expected rate of inflation.

Even if a government borrows in foreign currency (so devaluation or domestic inflation cannot affect the real returns to investors), additional debt may raise the real interest rate the government has to pay. Unlike a domestic lender to the government, a foreign lender may not be able to enforce a claim against the domestic government in the domestic courts. A foreign lender also has fewer options to agitate politically against a government that defaults on its loans, or raises taxes on interest remittances to foreign investors. Recognising these asymmetries, foreign lenders to a government might raise the interest rate at which they are prepared to lend as the total amount of debt rises. Lally (2000) suggests that one percentage point of the difference between the New Zealand and United States risk free rates is due to a combination of default risk and a discount for the lower liquidity of the market in New Zealand government debt.

Calling the default risk premium a 'country risk premium' creates a confusion about the source of the phenomenon. It is sometimes argued, for example, that interest rates charged to borrowers from a given country rise as the total foreign debt of all domestic agents, that is private sector borrowers plus the domestic government, rises.

Private sector borrowers differ from a government borrower in a number of respects. Typically, a private agent cannot borrow unless it has assets that are suitable as collateral. A private borrower also needs to present a credible business plan to its lenders and show how it will use the funds profitably to enable it to make future loan repayments. By contrast, a government is able to borrow without collateral because it has the power to tax its citizens in order to pay off its debts. Indeed, a government could borrow and spend the proceeds entirely on current consumption if it wished, as long as its implicit promise to use its tax powers is credible. The potential problem faced by foreign lenders to a government is that future politicians may decide that reneging on foreign debts, or changing tax laws affecting foreign residents, is preferable to taxing domestic citizens. In the case of a private firm, the risks are normal commercial ones that may be easier for lenders to assess. Another distinguishing feature of private loans is that the loan contract is often placed under the jurisdiction of the courts in the lender's country, or a respected

⁹⁸ Even though the US dollar also appears to have a currency risk relative to the Japanese yen, the risk premium is still less than the corresponding premiums for New Zealand and Australia.

third party country.⁹⁹ Loan contracts with private agents are thus usually much easier to enforce than otherwise equivalent contracts undertaken with sovereign governments.

There may, however, be a type of 'currency risk' associated with substantial foreign borrowing by private sector agents in a small economy. If many firms have unhedged debt obligations denominated in foreign currency, a devaluation of the domestic currency will simultaneously increase the liabilities of all of those firms. If the exchange rate movement is large, some of the firms might be forced into bankruptcy. Other domestic firms with a balance sheet weakened by the devaluation may then suffer a decline in revenue and also be forced into bankruptcy. Essentially, substantial foreign borrowing by a range of domestic firms creates the possibility for magnifying the balance sheet consequences of a large devaluation. Recognising this possibility, both domestic and foreign lenders to a domestic firm may demand higher interest rates as the foreign debt obligations of that firm increase.

The tendency for interest rates to rise as more firms become exposed to movements in a particular exchange rate is an example of a so-called pecuniary externality. A price rise in a market affects other market participants, making demanders worse off and sellers better off, but there is no implication that market outcomes are inefficient. On the contrary, the rise in price is signalling to buyers that the cost of supplying the product in question has increased, so they had better value it more highly if they wish to continue consuming it. The higher market price is also signalling appropriately to producers, or potential producers, that the product in question has become more valuable and it is now worth their while producing more of it. An externality that leads to an efficiency problem is an effect that one individual has on another that is not signalled through a change in price. Neither party then is given an incentive to behave differently.

Similarly, the rising cost of foreign borrowing signals the increasing risk of foreign debt to borrowers and encourages them to hedge their foreign exposure or shift to domestic sources of finance. An increase in foreign interest rates as foreign borrowing rises does not produce inefficiency.

5.3.8 *Currency areas and risks*

The presence of currency risk premiums suggests that countries would be better off abandoning their local currencies and joining a currency union. A common currency between two areas, however, does not necessarily eliminate risks of fluctuating purchasing powers of currency. As the examples of Hong Kong and Ireland show, countries sharing a currency can have different inflation rates. Unnecessarily high inflation rates in Hong Kong and Ireland impose costs just as inflation arising from an expanding over-supply of a domestically issued currency does. A common currency between Hong Kong and the United States, or between Ireland and Germany, reduces the risks of some types of relative price movements but increases the risks of other

⁹⁹ For example, many energy industry loan contracts are executed in Houston under US jurisdiction even when the parties are not US entities. Parties to the contract typically have sufficient assets or business interests in the United States, however, to enable a US court to enforce the contract if necessary.

unanticipated movements in relative prices. The critical issue becomes one of deciding which arrangement leads to a greater number of unanticipated relative price movements, and which relative price movements have larger short-run disruptive effects on economic activity.

The peso problem illustrates, however, that currency arrangements do not solely alter which firms or industries bear the costs of unanticipated price adjustments. By altering the conduct of monetary policy, the exchange rate arrangement can also alter the total amount of risk in the economy. A country that forgoes issuing its own currency also forgoes the opportunity to run an independent monetary policy. If domestic monetary institutions are superior to foreign ones, eliminating the domestic currency may raise risks overall, even though it lowers certain kinds of risks associated with unanticipated fluctuations in some prices of domestic goods relative to foreign ones. On the other hand, if domestic monetary and political institutions are weak, as in Mexico, allowing an independent domestic monetary policy is likely to raise overall risks in the economy, and stifle investment and economic growth.

The critical issue for a country such as New Zealand is whether it can devise a domestic monetary constitution that is superior to what it could obtain by joining with another country or group of countries. The choice of an exchange rate regime is just part of choosing an appropriate monetary arrangement.

REFERENCES

- Akerlof, G and J Yellen (1985), 'Can Small Deviations from Rationality Make Significant Differences to Economic Equilibria?', *American Economic Review* 75: 708–721.
- Bernanke, B (1983), 'Non-Monetary Effects of the Financial Crisis in the Propagation of the Great Depression', *American Economic Review* 73: 257–276.
- Bernanke, B (1986), 'Alternative Explanations of the Money-Income Correlation', *Journal of Monetary Economics*, Carnegie-Rochester Conference Series on Public Policy 49–100.
- Bernanke, B and M Gertler (1989), 'Agency Costs, Net Worth, and Business Fluctuations', *American Economic Review* 79: 14–31.
- Bernanke, B and M Woodford (1997), 'Inflation Forecasts and Monetary Policy', *Journal of Money, Credit and Banking* 29: 653–684.
- Bernanke, B, T Laubach, F Mishkin and A Posen (1999), *Inflation Targeting*, Princeton, New Jersey, Princeton University Press.
- Blanchard, O and N Kiyotaki (1987), 'Monopolistic Competition and the Effects of Aggregate Demand', *American Economic Review* 77: 647–666.
- Bordo, M and L Jonung (2000) *Lessons for EMU from the History of Monetary Unions*, London, The Institute of Economic Affairs.
- Brito, D and P Hartley (1995), 'Consumer Rationality and Credit Cards', *Journal of Political Economy* (April) 400–433.
- Coleman, A (1999), 'Economic Integration and Monetary Union', Wellington, New Zealand Treasury Working Paper 99/6.
- Cowen, T (1991), *The Reserve Bank of New Zealand: Policy Reforms and Institutional Structure*, Wellington, New Zealand Business Roundtable.
- Friedman, B (1983), 'The Roles of Money and Credit in Macroeconomic Analysis' in *Macroeconomics, Prices and Quantities: Essays in Memory of Arthur M Okun*, ed J Tobin, Washington DC, Brookings Institution.
- Friedman, B (1986), 'Money, Credit, and Interest Rates in the Business Cycle' in *The American Business Cycle: Continuity and Change*, ed R Gordon, Chicago, University of Chicago Press 395–458.
- Grimes, A, F Holmes and R Bowden (2000), *An ANZAC Dollar?* Wellington, Institute of Policy Studies.
- Grubel, H (1999), *The Case for the Amero*, Vancouver, The Fraser Institute.
- Hamilton, J (1987), 'Monetary Factors in the Great Depression', *Journal of Monetary Economics* 19: 145–170.
- Hargreaves, D and J McDermott (1999), 'Issues relating to optimal currency areas: theory and implications for New Zealand', *Reserve Bank of New Zealand Bulletin* 62(3): 16–29.
- Hartley, P (1988), 'The Liquidity Services of Money', *International Economic Review* 29(1): 1–24.
- Hartley, P (1990), 'Hoarding in General Equilibrium', *Economica* 57: 467–483.
- Hartley, P (1992), 'The Effects of Minimum Wage Laws on the Labour Market' in *Proceedings of the H.R. Nicholls Society's XIIIth Conference*, Adelaide, SA, November 13–14, 1992.
- Hartley, P (1994), 'Interest Rates in a Credit Constrained Economy', *International Economic Review* 35(1): 23–60.

- Hartley, P (1998), 'Inside Money as a Source of Investment Finance', *Journal of Money, Credit and Banking* 30(2): 193–217.
- Haslag, J and S Hein (1992), 'Macroeconomic Activity and Monetary Policy Actions: Some Preliminary Evidence', *Journal of Money, Credit and Banking* 24: 433–446.
- Haslag, J and S Hein (1995), 'Does it Matter How Monetary Policy is Implemented?', *Journal of Monetary Economics* 35: 359–386.
- Hayek, FA (1976), *Law Legislation and Liberty: Volume 2 – The Mirage of Social Justice*, Chicago, The University of Chicago Press.
- Hume, David (1752), 'On Money', in *Political Discourses*, Edinburgh, A Kincaid and A Donaldson, 1752.
- Kareken, JH and N Wallace (1977), 'Samuelson's Consumption-Loan Model with Country-Specific Fiat Monies', Staff Report No 24, Research Department, Federal Reserve Bank of Minneapolis.
- Keynes, John Maynard (1974, 1st edn 1936), *The General Theory of Employment, Interest and Money*, The Royal Economic Society, London, The MacMillan Press Ltd.
- Lally, M (2000), 'The Real Cost of Capital in New Zealand: Is it too high?', Wellington, New Zealand Business Roundtable.
- Lucas, R (1980), 'Two Illustrations of the Quantity Theory of Money', *American Economic Review* 70(5): 1005–1014.
- Manchester, J (1989), 'How Money Affects Real Output', *Journal of Money, Credit and Banking* 21: 16–32.
- Mankiw, G (1985), 'Small Menu Costs and Large Business Cycles: A Macroeconomic Model of Monopoly', *Quarterly Journal of Economics* 100: 529–539.
- Mehra, R and EC Prescott (1985), 'The equity premium: A puzzle', *Journal of Monetary Economics* 15: 145–162.
- Mundell, R (1961), 'The Theory of Optimum Currency Areas', *American Economic Review* 51: 509–517.
- Reddell, M (1999), 'Origins and early development of the inflation target', *Reserve Bank of New Zealand Bulletin* 62(3): 63–71.
- Rush, M (1985), 'Unexpected Monetary Disturbances During the Gold Standard', *Journal of Monetary Economics*: 309–321.
- Rush, M (1986), 'Unexpected Money and Unemployment: 1920 to 1983', *Journal of Money, Credit and Banking* 18: 259–274.
- Rush, M and P Loungani (1995), 'The Effect of Changes in Reserve Requirements on Investment and GNP', *Journal of Money, Credit and Banking* 27: 511–526.
- Selgin, G (1990), 'Monetary Equilibrium and the Productivity Norm of Price-Level Policy', *Cato Journal* 10(1): 265–287.
- Sherwin, M (1999), 'Inflation targeting: 10 years on', *Reserve Bank of New Zealand Bulletin* 62(3): 72–80.
- Svensson, L (1997), 'Inflation Targeting in an Open Economy: Strict or flexible inflation targeting?', Wellington, Victoria University of Wellington Foundation.
- Williamson, S (1987), 'Financial Intermediation, Business Failures, and Real Business Cycles', *Journal of Political Economy* 95: 1196–1216.
- Williamson, S (1988), 'Liquidity, Banking, and Bank Failures', *International Economic Review* 29: 25–43.