

THE USE OF MONETARY AGGREGATES AS MONETARY POLICY INDICATORS

John Tait analyses the usefulness of monetary aggregates as indicators of monetary conditions with particular reference to recent New Zealand experience.

Executive Summary

While incorporating movements in the money and credit aggregates into its checklist of indicators of monetary conditions, the Reserve Bank places less weight on these movements than it does on movements in other indicators, such as in the exchange rate and the yield curve. The reason for placing a lesser weight on the monetary aggregates as an indicator of monetary policy is that, over recent years, movements in the aggregates have not provided reliable signals as to movements in demand and inflation. The processes of financial deregulation and financial innovation, coupled with major interest rate and taxation rate changes, have been major factors in altering the public's demand for various categories of money and credit, and hence in altering the relationship between the monetary aggregates and nominal demand. Similar breakdowns in the relationship between the monetary aggregates and nominal demand have also occurred in many overseas countries. While these developments mean that the Reserve Bank cannot rely solely on the aggregates as indicators of monetary policy, they do not preclude the fact that the aggregates still contain some useful information with regard to monetary conditions. Hence the aggregates have been retained as one of a number of monetary policy indicators used by the Bank.

Introduction

The Reserve Bank incorporates movements in the money and credit aggregates into its checklist of indicators of monetary conditions. Conceptually, if the monetary aggregates rise sharply, they may be signalling some incipient inflationary pressure that requires a monetary policy response. However the Bank has found, in recent years, that changes in the aggregates have often not proved to provide reliable signals as to changes in demand and inflation. More weight has therefore been placed on other monetary indicators such as the exchange rate and the interest rate yield curve.

This practice of using a checklist of indicators is now common amongst other central banks, although a small number such as the Swiss and West German authorities, still place major – although not total – emphasis on movements in the monetary aggregates as a guide for monetary policy. In the early 1980s, many authorities placed greater weight on targeting the monetary aggregates in order to bring down inflation from the high levels following the 1970s oil shocks. However, most have progressively reduced

this emphasis as the aggregates have failed to provide reliable signals of inflationary developments. This article places these developments in New Zealand and overseas in perspective, firstly by analysing briefly why one may wish to target monetary aggregates in order to stabilise prices and, secondly, by analysing recent experience in using the aggregates.

Theoretical Basis

The Quantity Theory of Money provides a theoretical basis for targeting monetary aggregates in order to control inflation. The theory states that the quantity of money in the economy, multiplied by the number of times that money is spent in a particular period, must necessarily be equal to the value of all transactions in the economy. This relationship is expressed mathematically as follows:

$$MV = PT$$

where M is the supply of money; V is the velocity, or the number of times the stock of money is used in a particular period; P is the price level; and T is the volume of all transactions conducted in the period.

The volume of transactions (T) reflects the real output of the economy which is determined primarily by real economy factors such as the level of savings, technology, and the size and skill levels of the labour force. These real economy factors are largely stable in the short term, and monetarists, such as Milton Friedman, have assumed that T can be approximated by the trend rate of growth in the economy for the purposes of managing monetary policy. In the 1960s and 1970s monetarists advanced econometric evidence to show that the velocity of money (V) was also stable over time. Hence, in the above mathematical relationship, with the stability of T and V, one could conceivably target solely the supply of money (M) and the desired price level would result. In particular, if V were fixed and real output was growing at say 3 per cent p.a., then a 3 per cent annual growth in the money supply would yield a constant price level.

Experience with Aggregates

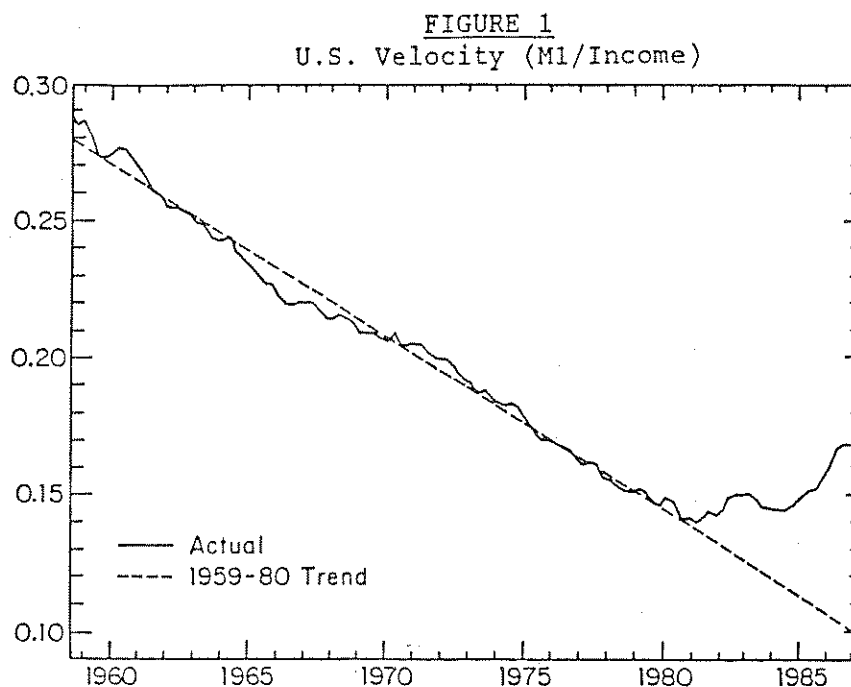
In many countries, econometric estimation undertaken in the 1960s and early 1970s tended to support the

contention that changes in the monetary aggregates were closely related to inflation. At the time, it was argued that the monetary authority could stabilise the price level by restricting the growth in the money supply to a level close to the long run level of output growth. The monetary authorities in many major economies accepted the arguments raised by monetarists such as Friedman and began to target one or more monetary aggregates.

Unfortunately, the simple relationships between money supply and prices found in a number of countries at that time have proved to be less robust than many believed in the early 1970s. The relationships between the targeted aggregates and prices began to destabilise, so that, in terms of the quantity theory, velocity became unstable. As a result, a change in money supply did not prove to be a good indicator of future inflation. In the United States, for example, velocity – expressed as the ratio of money supply to nominal income – declined in a stable fashion through to the early eighties then suddenly reversed (see figure 1), meaning that recent increases in the money supply did not feed through to nominal income growth as expected.

There appear to be a number of reasons for instability in velocity and hence in the relationships between the supply of money and prices. First, it appears that the demand for the targeted aggregate frequently did not respond in the same way after targeting to changes in aggregate demand as before targeting. Consequently, as soon as the monetary authority attempted to lower inflation by targeting a particular aggregate, the empirical relationship between that aggregate and inflation changed, resulting in a different inflation outcome than expected. This response is known as Goodhart's Law.

Secondly, the original studies undertaken to establish the relationship between money and prices tended to overlook short term instability in the demand for money and



Source: B. Friedman, Working Paper 2552, National Bureau of Economic Research Inc.

therefore in the relationship between money and inflation. All studies produced in the 1960s and early 1970s found occasional runs of data that did not lie on the predicted equation. Such errors do not matter in the medium term, but they do matter in the short term to the monetary policy maker.

Thirdly, institutional changes, including deregulation of the financial sector and moves to more market oriented economic policies, appeared to cause shifts in the demand for particular types of money as financial and other forms of deregulation began to influence the form in which agents hold money balances.

In New Zealand the change in the methods of monetary control and government funding were particularly important. In 1984, Government moved from targeting bank lending and deposits using the reserve asset ratio system, to a system without direct controls in which the supply of primary liquidity (bank reserves) was targeted. This change in approach decreased the implicit tax

on the trading banks associated with the reserve ratios and, following the removal of interest rate restrictions, the banks increased the interest they paid on deposits. These moves increased the return on these deposits relative to savings in lawyers' trust funds and in other peripheral institutions whose funding and claims are not recorded in the monetary aggregates. As a result, investments in lawyers' trust funds and peripheral institutions appear to have decreased significantly since 1984 being transferred, at least in part, to (mainstream) M3 institutions. Consequently, during the period following deregulation, the measured monetary aggregates (which relate solely to M3 institutions) recorded rapid growth, but this growth was not indicative of the slower growth in nominal income.

The shift of funds from the peripheral institutions to the 'core' institutions was encouraged by the decline in the sharemarket in October 1987 as investors placed a higher priority on security and placed their

funds in larger institutions such as the traditional trading banks. This process pushed up the monetary aggregates and, in particular, the narrow aggregates, faster than the overall increase in credit and money in the economy.

Deregulation also led banks to raise the level of lending to the personal sector. The consumer tended to increase gearing (borrowing) and at the same time increased deposits and holdings of other financial assets such as shares. This process resulted in the average New Zealander holding higher levels of financial assets and liabilities than previously, which translated into rapid growth in both the money and credit aggregates. However this growth was not fully reflected in spending and inflation. In effect, prior to deregulation, the consumer held a less than optimal mix of financial assets and liabilities, and took the opportunity to increase gearing following deregulation.

Some developments in the wholesale money markets in the 1980s further distorted the monetary aggregates. In particular, some corporates, on occasions took advantage of rapid rises in call rates to borrow on overdraft and on-lend through the money markets at a profit. These actions increased both the volume of lending and deposits by institutions and tended to increase both the money and credit aggregates without a corresponding increase in expenditure or nominal income.

Another important development was the opening of the capital markets to the rest of the world. This institutional change in December 1984 allowed the local investor to build up liquid overseas assets not included in the measurement of the money supply.

Taxation rates and the level of nominal interest rates influence the profitability of holding financial assets and liabilities, and so also may affect the relationship between the level of monetary aggregates and nominal income. If there is a rise in nominal interest rates and/or a fall in tax rates then the demand for non-

interest bearing money will fall, as people substitute out of cash and non-interest bearing deposits into interest bearing accounts. As a result, one cannot concentrate solely on the level of the aggregates as an indicator of nominal activity following changes in interest and tax rates. One must also attempt to judge by how much money holdings have altered in response to the change in the rate of return. The major changes in interest and taxation rates in this country over the past five years have increased the likely relevance of this factor in New Zealand.

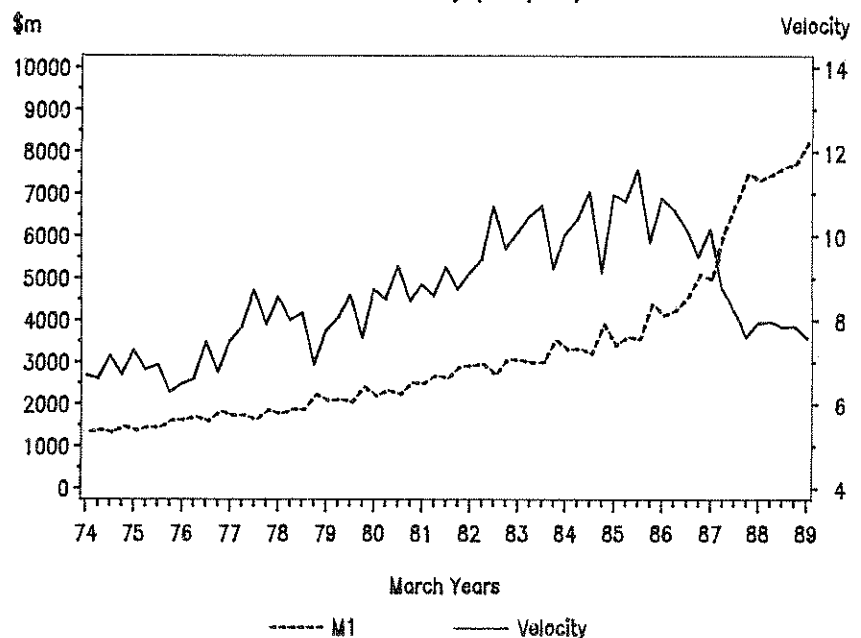
The last decade has also been characterised by significant financial innovation generated by a number of factors. These factors include the high nominal and real interest rates in most countries, the increased volatility of exchange rates and interest rates, the tax treatment of interest receipts and payments, the process of financial regulation followed by deregulation, and the development

of communications and computer technology. In order to avoid financial risks related to the greater volatility in exchange rates, corporates and others have tended to increase dealings in forward markets, swaps and options. These, and other similar actions, have decreased the demand for deposits and other instruments included in the money and credit aggregates.

The above factors resulted in a fall in velocity – measured here as the ratio of nominal income to the money supply – in the mid 1980s (see figures 2 and 3) reversing the trend of previous years. This was reflected in the velocity of both M1 (figure 2) and M3 (figure 3), underlining the difficulties in targeting these aggregates in recent years.

Recent econometric research undertaken at the Reserve Bank also indicates that velocity has not been stable or predictable over recent years in New Zealand. Three recent studies have been released as discussion papers by the Bank; ab-

Figure 2
M1 and Velocity (GDP/M1)



stracts of these papers are included elsewhere in this issue of the *Bulletin*. In the first, by R.P. Greville entitled 'Monetary Targets And The Demand For Money', demand functions for various money aggregates, including notes in circulation and private sector credit, were estimated. The results indicated that the demand for the narrow aggregates was relatively more explainable than the demand for the broader aggregates. However, the demand functions even for the narrow aggregates were not sufficiently robust to seriously support a strict targeting regime.

The second study, by A. Coleman and P.F.J. Cruse, entitled 'An Investigation of Monetary Targets In A New Zealand Context', investigated the relationship of the money and credit aggregates to inflation and nominal Gross Domestic Product over the 1980s. None of the aggregates bore a sufficiently strong, predictable and stable relationship to

nominal income over this period to be considered suitable as monetary targets.

The third study was undertaken by A.Y-T. Wong, A. Grimes and C.S. Meads entitled 'Modelling The Financial Asset Holdings of the Non-Bank Private Sector In New Zealand'. This research attempted to explain the non-bank private sector's holdings of M1, M3 and government securities within a portfolio perspective. The research indicates that the non-bank private sector substitutes significantly between transactions deposits, time deposits and government security holdings on the basis of interest rate and taxation rate changes. Such substitutability means that money aggregate targeting would face considerable problems when interest rates or taxation rates are varying. Hence these results are also not supportive of a strict money aggregate targeting approach in the current New Zealand context.

Alternative Monetary Aggregates

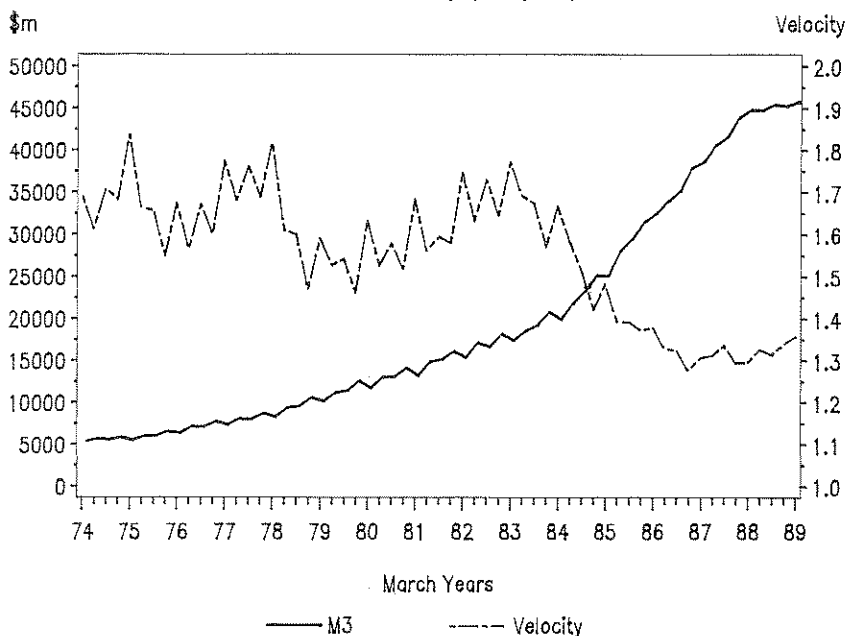
As is detailed above, the existing monetary aggregates may not be a useful indicator of nominal activity during periods of rapid change in the financial sector. A shift between transactions balances and time deposits, caused for instance, by technological innovation, would alter the narrow aggregates while leaving a broad aggregate unchanged. However, the liquidity of the system would have changed since transactions balances are more liquid – that is, they are more quickly accessible – than are time deposits. Consequently, the relationship between the broad aggregate and nominal activity may alter.

In order to overcome this problem, various statisticians and economists have attempted to weight assets by ratios indicative of their liquidity. The sum of the weighted assets is intended to measure the overall liquidity available to economic agents to support spending, and monetary policy could conceivably aim to stabilise this measure of liquidity in the economy. However, attempts to construct these alternative aggregates, called *divisia* aggregates, have been problematic because the weights are difficult to determine. The weights are calculated from the imputed yields to liquidity which are assumed to be equal to the yield of an illiquid equivalent instrument less the yield of the instrument to be weighted. This methodology has problems, however, as the methodology implies that non-interest bearing currency is considerably more liquid than is money held in interest bearing cheque accounts, which clearly is not the case. The presence of such difficulties means that *divisia* aggregates have yet to receive widespread attention from monetary authorities.

Summary

The Reserve Bank includes the monetary aggregates in its list of monetary policy indicators, but their

Figure 3
M3 and Velocity (GDP/M3)



current information content is considered to be less than that of some of the other indicators, such as the exchange rate and the interest rate yield curve.

Over the last decade, the relationship of the monetary aggregates to the liquidity of the public, and to nominal GDP and inflation has not

been strong. This failure on the part of the aggregates is due to a number of factors, including the deregulation of the financial sector, the removal of exchange controls, financial innovation, the development of new computer and communications technology, and increased customer sophistication. Should these trends

slow then it is possible that the monetary aggregates will again track nominal activity more closely, in which case the importance placed on the aggregates as indicators of monetary conditions will likely increase. ██████████