

Money and Credit Measures: Useful Economic Indicators?

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Introduction and summary

The role of money in influencing prices and real sector activity, and its value as an economic indicator, have long been topics of debate among economists and among government officials responsible for devising and implementing economic policy. The Reserve Bank, which is responsible for implementing monetary policy, has a particular interest in these issues.

The aims of this article are to:

- provide a simple overview of relevant economic theory;
- describe some of the results of research undertaken within the Reserve Bank; and
- comment on recent trends in monetary statistics.

One important conclusion is that money velocity measures show a fair amount of variability so any particular money supply growth rate may be consistent with a wide range of price level and real income outcomes. However, work is being undertaken to identify and remove various influences from monetary series. This may make it easier in future to assess the significance of money supply growth rates as indicators of inflationary pressures.

The Quantity Theory of Money

A useful starting point for discussing the role of money as a determinant of inflation is the 'Quantity Theory of Money'. The simplest formulation of the Quantity Theory is expressed in the equation:

$$MV = PY$$

where:

M = The supply of money.¹

V = The velocity of circulation, or the number of times the supply of money changes hands in transactions in some period, usually a year.

P = The general level of prices.

Y = The real value of all final goods and services produced in a certain period.

This equation is an identity because each side of the equation, by definition, equals the nominal value of all transactions in a country in a certain period. The identity is developed into an economic theory by making various assumptions. The most important of these is that V is constant, or at least changes only slowly.

The origins of the Quantity Theory can be traced back to the writings of the 'Classical Economists' of the nineteenth century such as Ricardo and Marshall. Features of this school were assumptions that prices in all markets, including wages in the labour market, adjusted quickly to equilibrium, so that real income, Y, was determined by real supply factors. Real income was believed to be independent of the money supply, which in turn was assumed to be exogenous. It followed from the Quantity Theory that, for given values of Y and V, the price level would grow in direct proportion to changes in the supply of money.

This theory was challenged by Keynes in the 1930s. At that time, during the Great Depression, the level of unemployment was extremely high throughout the developed world. Keynes argued that real income was determined by aggregate demand, not just by supply, and that some markets did not adjust quickly to equilibrium. So, Keynes asserted, national income could settle below the full employment level for a prolonged period. He also argued that the supply of money influenced interest rates and thus investment and real income. The money supply, according to Keynes, was an important determinant of aggregate demand and national income.

In Keynes's view, both real income and interest rates influenced the demand for money. Although the money supply indirectly influenced the price level through its impact on real income, there was no simple one-to-one relationship between the money supply and the price level.

Much of Keynesian theory, in particular Keynes' view on the role of money, was in turn challenged by Milton Friedman in the early 1960s. Friedman restated the Quantity Theory in terms of the demand for money, as follows:

$$M^D = k(PY)$$

¹ There are several measures of the money supply, ranging from notes and coins to measures which include transactions balances and term deposits at banks and other financial institutions (see separate box in this article).

The terms in this equation were defined as follows:

M^D = The demand for real money balances.

k = The reciprocal of the velocity of circulation.

Y = 'Permanent Income', or people's expectations of their average long-run income.

P = The general level of prices.

A key assumption of Friedman's was that k can change, but that it was a stable function of a small number of variables. The most important of these variables were interest rates and the rate of inflation. It is also assumed that the money market is in equilibrium so that money demand equals money supply. So we can write:

$$M^D = M^S = k(PY)$$

It is important to note that in Friedman's view the direction of causation runs from the money supply to nominal income. It follows, according to Friedman, that nominal income, PY , can be predicted from M^S .

Friedman argued that in the short-run, changes in the money supply would generally affect both the price level and real income. In the long-run, though, real income was exogenous, being determined by real factors. In the long-run, changes in the money supply would be fully reflected in changes in prices.

Friedman's formulation became known as the New or Modern Quantity Theory of Money. Its key contention was that the supply of money is extremely important in determining nominal income. Friedman argued that if governments maintained a low, stable growth in the money supply, then inflation would also be low and stable. Furthermore, this would provide a good environment for economic growth. The term "Monetarism" came to be applied to Friedman's theory and policy prescriptions.

Monetary indicators research

The Reserve Bank, and others, have carried out several studies to investigate linkages between money supply measures, prices and national income in New Zealand. These have been undertaken to determine whether the relationships predicted by variations of the Quantity Theory are sufficiently strong and consistent to be used for policy purposes.

If, for example, the money supply was found to determine the price level, then money supply statistics could be used to forecast inflation. This would not be possible, however, if money and prices were found to be depend-

ent on real income. Even in that case, though, it might be possible for money supply statistics to be used as indicators of real income and prices, if monetary statistics are published earlier than the others.

(a) Research during the 1980s

The overall conclusion from a group of studies completed in the late 1980s was that the long-run relationships between nominal income, PY , and the narrow monetary aggregates, such as $M1$, and also the credit aggregates, were weak or ill-defined.² However, a number of the studies found that $M3$ tracked nominal income well over long periods of time, but not over short periods. In particular, there was no clear relationship which would have been desirable if any of the aggregates were to be central to ongoing monetary policy formulation.

These findings were similar to results obtained from corresponding studies overseas. Many economists now believe that the direction of causality in the Quantity Theory equation runs from nominal income to money demand and money supply. It would therefore be very surprising to find monetary aggregates to be very helpful in forecasting nominal income.

Nevertheless, money supply measures may be useful for monitoring real and nominal income. Money supply statistics are normally released some weeks before national income figures for the same period. Expected money supply growth rates can be calculated from trend velocity, forecast economic growth and the rate of price inflation. If actual money supply growth is higher than expected then that may be an indication that the real economy is growing more strongly than has been forecast, or that prices are rising more quickly than expected. But it is also possible that the unexpected element of money growth may be due to shifts in velocity.

Researchers in New Zealand and overseas also concluded that several factors operated during the 1980s to cause the velocity of circulation, V , and thus the demand for money, to vary significantly over time. These factors included internal and international financial deregulation, financial innovation and major interest rate and taxation changes.

² For more detail see Wong and Grimes, 1992.

(b) New research

The Reserve Bank has begun to re-examine the relationships between the monetary and credit aggregates and other economic variables.

One reason is that in 1987 the Reserve Bank introduced a new banking, or 'M3 sector', survey and a new set of monetary and credit aggregates. These covered a wider range of financial institutions and financial instruments than the old aggregates. Research in the 1980s mainly used the old aggregates. Some research that used the new series had only very short samples of data. It is possible that research on the new monetary series will generate more useful results.

Another reason for undertaking further research is simply that, as time passes, new data, covering a longer period become available. It is possible that velocities of circulation have become more stable now that the extensive deregulation of the mid-1980s is some way behind us. In 1987 data were collected from some banks so that the new aggregates could be backdated to January 1981. Time series spanning thirteen years are therefore now available.

Finally, econometric techniques are constantly being improved and refined. The application of new techniques to

new data series might reveal relationships not detected previously.

Preliminary analysis carried out within the Reserve Bank suggests that once the effects of structural change in the economy are accounted for, the behaviour of M1 moves in a manner consistent with the predictions of mainstream monetary economics. Thus the preliminary analysis suggests that M1 could serve a useful indicator role in conjunction with our other economic indicators.

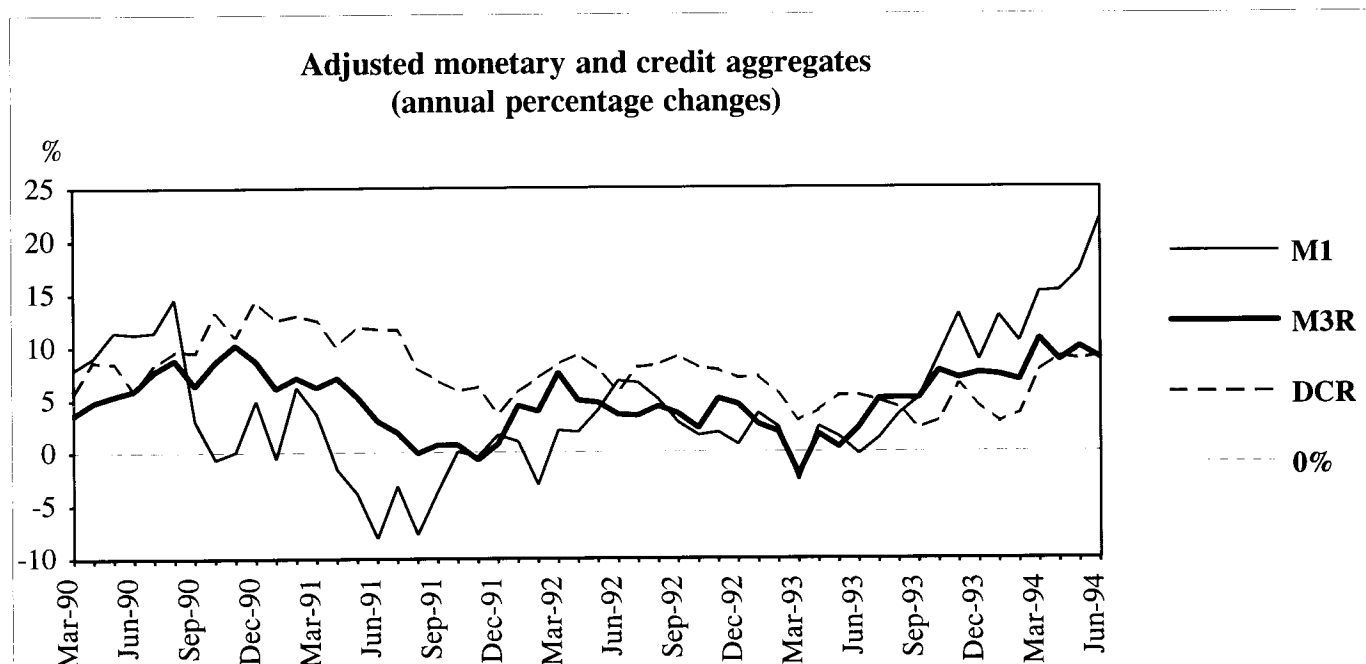
Recent trends in monetary data

(a) Growth rates of money and credit aggregates

Figure 1 illustrates the growth rates of three of the most commonly monitored monetary aggregates, M1, M3(R) and the resident measure of Domestic Credit, DC(R), over the last few years.³ It can be seen that there has been considerable variation among the growth rates of these aggregates over the period covered.

During 1991 and most of 1992, DC(R), a broad measure of credit, was growing significantly more strongly than the corresponding broad measure of money, M3(R). More recently, M1 has been growing considerably faster than both M3(R) and DC(R). These variations can be attrib-

Figure 1



3 The annual percentage changes are derived from series that have been adjusted to remove discontinuities arising from the introduction of new M3 financial institutions at various dates in the past. For further information see Boaden 1994.

Definitions of Money and Credit Measures

The current monetary and credit aggregates were introduced in April 1987. They are compiled from a monthly survey of M3 Financial Institutions (M3FIs). M3FIs comprise the Reserve Bank, registered banks, finance companies, building societies, merchant banks and stock and station agents.¹

The official money and credit aggregates are New Zealand dollar measures. They include New Zealand dollar funding of M3FIs (mainly household and business bank deposits) and New Zealand dollar claims (lending) of M3FIs. They exclude foreign currency funding and claims. The definitions of the aggregates are as follows.

M1 = Currency (notes and coin) on issue
- currency held by M3FIs
+ chequable, eftpos-accessible and sweep accounts ('transactions balances')
- inter-institutional chequable or eftpos accounts
- central government deposits.

M2 = M1 + all non-M1 call funding
- inter-institutional call funding.

1 Further information on the introduction of the new measures can be found on pp 134-135, and pp 227-230, *Reserve Bank of New Zealand Bulletin*, Vol 50, 1987.

M3 = M2 + all other funding
- all other inter-institutional funding.

Private Sector Credit (PSC)
= M3FIs' total claims on the private sector
- inter-institutional lending.

Domestic Credit (DC)
= PSC + claims on Government, and on marketing and stabilisation account balances.

In 1992 the Reserve Bank began publishing the resident measures M3(R), PSC(R) and DC(R). These are essentially similar to M3, PSC and DC except that they include only *New Zealand resident* funding and claims in New Zealand dollars. They exclude non-resident New Zealand dollar funding and claims and foreign currency funding and claims.²

2 For further information see Boaden (1992).

uted to financial innovations and structural changes taking place within the financial sector.

The rise in the annual growth rate of M1 over the last few years substantially reflects financial innovations introduced by registered banks, in particular EFTPOS (electronic funds transfers at point of sale). Bank customers can use debit cards to draw on funds in their bank accounts to pay for goods at the increasing number of retail outlets equipped with EFTPOS terminals. In 1990 all major banks agreed to integrate their EFTPOS services. Since then, according to statistics compiled by the New Zealand Bankers' Association, the number of EFTPOS terminals has increased from 1700 to over 4000. The number of EFTPOS transactions rose from 7.2 million in 1990 to 46.5 million in 1993.

Most banks have allowed their customers to gain access to their call savings accounts through EFTPOS. Funds in these accounts have therefore become "transactions balances" (see Box) and boosted the value and growth rate of M1.

The introduction of automatic teller machines (ATMs) may also have affected M1, though its effect is less clear. ATMs allow bank customers to withdraw cash, and to have access to other bank services, 24 hours a day at many sites. At the end of 1993 there were almost 1100 ATMs in New Zealand compared to 800 in 1988.

Notes and coins are one component of M1. The growth in the number of ATMs has enabled most people to obtain cash more easily. Many people probably draw cash from bank accounts more frequently, but in smaller amounts. They would therefore hold less cash on average than in the past. On the other hand, it is possible that easier access to cash has encouraged some people to use cash rather than cheques to settle some transactions. The overall impact of ATMs on the demand for currency and M1, therefore, is uncertain.

The annual growth rate of M3(R) has been more stable than that of M1. In absolute terms, M3(R) is about five times larger than M1, so the financial innovations described above had a proportionately smaller impact on

M3(R). Also, some of the recent growth in M1 is due to funds being shifted into transactions balances from other types of accounts. Such changes represent shifts between different types of deposits within M3(R). As a result, such shifts leave overall M3(R) unaffected.

Nevertheless, some features of the growth of M3(R) deserve comment. **Figure 1** shows, as noted earlier, that in 1991 and much of 1992, M3(R)'s growth fell significantly below that of DC(R). This is unusual because M3(R) represents the main liabilities of M3 financial institutions, (M3FIs), to the New Zealand non-financial business and household sectors, while DC represents M3FIs' main assets. The two measures are related by the equation:

$$M3(R) = DC(R) + \text{Net Overseas Assets} + \text{Residual Items}^4$$

Unless there are significant changes taking place in M3FIs' net overseas assets, or the residual items, then we would expect M3(R) and DC(R) to grow at similar rates. For much of 1991 and 1992, however, several banks reported large increases in New Zealand dollar deposits from non-residents. This caused a decline in the net overseas assets of M3FIs. Such deposits are not included in M3(R), but the funds obtained supported the growth of lending in New Zealand and this lending was captured in DC(R). As a result, M3(R) was actually contracting on an annual basis in late 1991 while DC(R) was growing at about 5 percent per annum.

Over the last twelve months, non-resident New Zealand dollar funding has declined. Growth in M3FIs' lending has been sustained by stronger New Zealand resident deposits. As a result, M3(R) has expanded faster than DC(R), as shown in **Figure 1**.

(b) Trends in velocity

The factors described above that have caused changes to the growth of money and credit measures are mainly independent of nominal income growth. This suggests that the simple velocity term, V , in the Quantity Theory equation may not have been stable.⁵ **Figure 2** shows trends in the velocities of M1, M3(R) and DC(R) since 1989.

In each case V is calculated from the expression:

$$V = (PY) / M$$

4 Residual Items include fixed assets, such as property, trade debt(or)s and credit(or)s, capital and reserves.

5 It is possible, however, that a time series of money velocity, which incorporated the effects of structural change, would be more stable.

The real income measure used for Y is the production-based measure of GDP. Ideally, GDP deflators would be used for the price index, but these are only available annually so the Consumers Price Index (CPI) is used instead. M represents M1, M3(R) and DC(R) respectively. Each measure of velocity is then converted to an index which is set at 100 in March 1989.

Figure 2 shows that the velocities of M1 and M3(R) were reasonably stable over the period from March 1989 to March 1994. However, in the early part of the period they followed divergent paths because M1 was rising strongly and M3(R) was growing only slowly. As a result, the index for the velocity of M3(R) rose to about 105 while that of M1 fell to 95. They later converged to around their original level of 100.

The velocity of DC(R) followed a generally downward path over the period covered. This indicates that DC(R) has been expanding faster than nominal income since 1989. The main source of credit growth in New Zealand over the last several years has been lending by M3FIs to households for housing. This has grown by between about 7 and 15 percent per annum since 1989. Consequently, the annual growth rate of DC(R) has generally varied within the range of 5 and 13 percent.

Figure 2 shows that, in terms of levels, the velocities of M1 and M3(R) have shown less variation than that of DC(R). **Figure 2** also suggests that the quarterly changes of M1 may have been somewhat more variable than those of M3(R) and DC(R). This is confirmed by calculations of the standard deviations of the quarterly changes which were as follows.

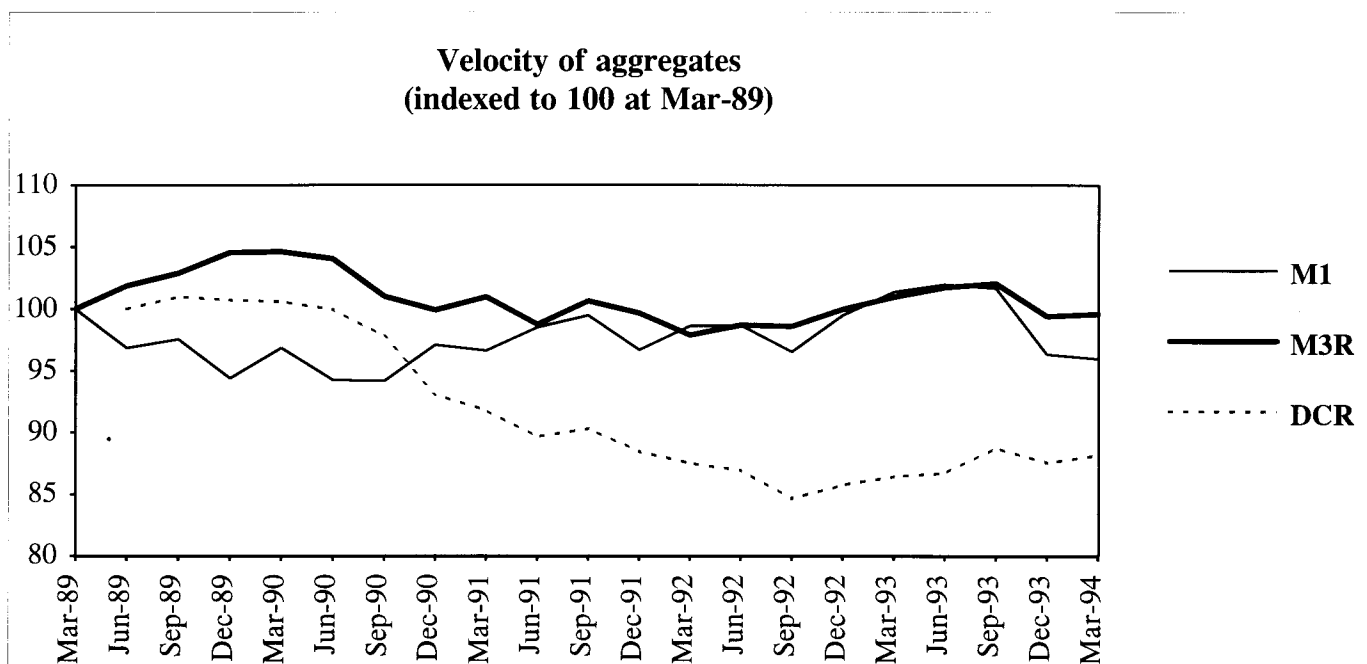
M1	2.36
M3(R)	1.49
DC(R)	1.70

The corresponding standard deviations of quarterly changes in real income and the price level were:

GDP	1.11
CPI	0.82

These are substantially lower than the figures for the velocity measures. This means that forecasts for inflation or real activity growth based on the simple Quantity Theory equation will have margins of uncertainty considerably wider than the typical range of quarterly movements in inflation or activity.

Figure 2



Conclusions

Research carried out by the Reserve Bank some years ago, and the initial findings of more recent work, indicate that money velocity measures have shown no sharp structural changes. In other words, they are not unstable and they may be useful economic indicators. However, velocity measures show a fair amount of variability. A wide range of price level and real income outcomes are, therefore, consistent with any particular money supply growth rate.

The Reserve Bank is continuing research designed to develop better models of money velocity. Work is being done to remove trend, seasonal and structural influences from money supply and money velocity series. Such work may make it easier in future to interpret changes in money supply growth rates, and in particular to assess their significance as indicators of changes in inflationary pressures. ■

References

- Grimes, A and Wong, J, (1992) 'The Role of the Exchange Rate in New Zealand Monetary Policy', *RBNZ Discussion Paper G92/8*
- Boaden, A, (1994) 'New M3 Financial Institutions', *RBNZ Bulletin Vol 57 No. 2*.