Articles

Defining money and credit aggregates: theory meets practice

By Sean Collins, Clive Thorp and Bruce White[1]

"Inflation is always and everywhere a monetary phenomenon"

Milton Friedman, Nobel laureate

"We didn't abandon the monetary aggregates, they abandoned us"

Gerald Bouey, former Governor, Bank of Canada

These two quotes convey succinctly a conundrum central banks face. Probably without exception, central bankers the world over would agree that rapid money growth and inflation are closely correlated. And yet by the mid-1990s many central banks, including the Reserve Bank of New Zealand, had placed less emphasis on monetary aggregates as inflation indicators. In this article we examine one reason for this apparent inconsistency, namely the difficulty of marrying theory and practice in defining money and credit. We conclude that despite these difficulties money and credit aggregates may usefully supplement a central bank's array of inflation indicators, but, like all inflation indicators, they need to be used judiciously.

---

1   Introduction

The very phrase "monetary policy" suggests that at its core the attempt of a central bank to control inflation is inextricably linked to money. Indeed, if there is one thing economists agree on it is that inflation is associated with too rapid growth of a nation's money stock. Figure 1 illustrates this point. The figure plots 25-year average inflation rates for selected (mainly OECD) countries against 25-year average growth rates of money for the same countries. The scatter of points (denoted by circles) lie along a line with a slope of nearly one (the solid line). This indicates that, in general, across a broad array of countries, inflation is closely correlated with the growth rate of a nation's stock of money balances.

In a modern economy, money comprises "fiat" money, that is paper money, and indeed nowadays mostly "electronic" money (in the form of electronic records of deposits held at banks)[2]. This means that any analysis of money in the economy is necessarily focused on the financial system, and the banking system in particular. It also means that when we talk about monetary expansion (or contraction), we are also talking about bank credit expansion or contraction. The deposits, or money balances held with banks are the direct counterpart to the assets that banks hold on the other side of their balance sheets, namely their loans. When a bank

Figure 1:
Cross-country evidence on (broad) money growth and inflation (average 1972-1996)
Source: International Financial Statistics (IFS); RBNZ calculations
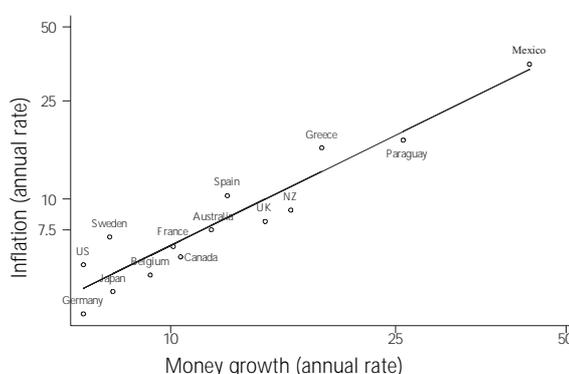
Note: "Broad money" is the sum of IFS measures of "money" plus "quasi-money". For most countries, that will be roughly comparable to New Zealand's broad money aggregate M3.

---

[1]   With important contributions from W Razzak and C Smith.

[2]   Fiat money is to be contrasted with 'specie', ie money in the form of precious metals.

makes a loan it places the amount of the loan (which constitutes "credit") in the borrower's deposit account (which constitutes "money"), and the latter can be "spent". Hence, an analysis of the role of money in the economy needs to incorporate the role of credit. Thus, throughout this article money and credit will often be referred to together. Indeed in many respects they are "different sides of the same coin."

It will be apparent from this account of money and credit that banks play a dual role in the economy. They act as intermediaries between savers and borrowers, and bank deposits, which are mostly either directly transferable (through chequing and electronic payments systems) or readily convertible into a transferable form, serve as the principal form of money in the economy.

For several reasons central banks have devoted considerable effort to tracking and analysing measures of money and credit. First, central banks have monitored measures of money (deposit balances) because of the close association between money growth and inflation.

Secondly, central banks have watched credit aggregates (the asset side of banks' balance sheets) because of the links between credit and money as well as the more direct link between the financial and other sectors of the economy. As a rule maintenance of macroeconomic stability, including stability of the price level, goes hand-in-hand with the health and stability of the financial sector. A credit crunch, which is a sharp contraction in the supply of credit to the economy, is by definition precipitated in the financial sector. If banks suddenly become more reluctant to lend, so much so that businesses become unable to obtain new financing or are unable to roll-over existing loans, an economic downturn might ensue. Consequently it makes sense for the central bank to monitor banks' lending practices.

Thirdly, central banks have monitored developments in money and credit because the effects of monetary policies are transmitted to the rest of the economy through the financial sector. To be sure, much of the effect of monetary policy is transmitted via financial market prices (ie interest rates and exchange rates), but to some extent there are also more direct quantity effects, via what has come to be known in the literature as the 'credit channel' (discussed further below).

Despite all this, by the early 1990s many central banks had placed less weight on money and credit aggregates. With a few exceptions — notably Germany — most countries eschewed the idea of trying to **control** monetary aggregates or other kinds of monetary quantities (including quantities such as bank reserves, base money, and so on) as a means of controlling inflation. Countries such as New Zealand, the United States, Canada, the UK, and others went even further, down-weighting the use of monetary aggregates as **indicators** of inflation. Although credit aggregates probably never achieved the degree of disfavour accorded to monetary aggregates (indeed as we point out below, credit aggregates have probably gained a degree of ascendancy over monetary aggregates, at least in academic circles), they probably suffered from a bit of "guilt by association" with monetary aggregates.

In part, the shift in emphasis away from money and credit aggregates reflected the fact that, in some of these countries, the statistical models used to forecast financial sector aggregates went badly off track. That, in turn, suggested that the links between money and inflation had weakened, perhaps so much so that money could no longer be relied on as an accurate gauge of inflation pressures. In addition, the change in emphasis reflected the realisation that financial restructuring could lead to a rapid expansion or contraction in bank lending and deposits, but with little total effect on spending in the economy. In New Zealand, for instance, following the deregulation of the banking sector in the mid-1980s, banks gained deposits at the expense of a range of non-bank institutions and solicitors' trust accounts. However, this transfer of funds did not amount to money and credit expansion in any substantive sense; rather it amounted to 'reintermediation' of financial flows or, in more technical terms, a reduction in the 'velocity' of circulation of the expanded stock of (bank) deposits.

The appropriateness of the shift of emphasis away from money and credit aggregates was confirmed in the 1990s with the growing recognition that some industrial countries were experiencing bouts of relatively brisk money and credit growth with little apparent pressure on overall inflation. For instance, in the 1990s New Zealand saw rates of broad money growth that averaged over 8 percent (figure 2). Ordinarily, one might have expected such elevated growth rates of money to contribute to a rise in inflation. In fact, from 1992

Figure 2:
Inflation and growth rate of money (M3)
Source: RBNZ and SNZ
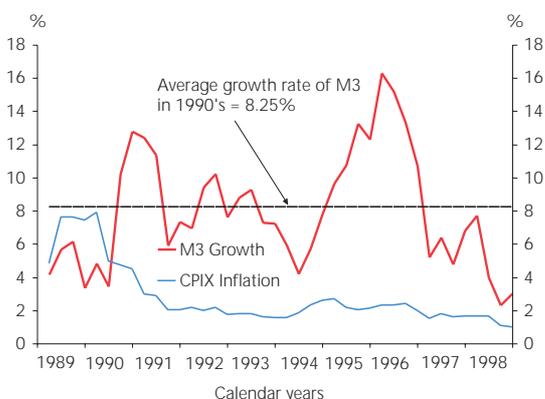
on, New Zealand's consumer price inflation (CPIX) remained mostly in a 1.5 to 2.5 percent range. In the United States, in the late 1990s money and credit growth accelerated to rates well in advance of nominal output growth. However, the inflation rate in the US actually **fell** over this period. Similar episodes can be found for other countries as well.

However, it is one thing to downplay the importance of money and credit aggregates — which seems entirely appropriate in light of the experiences of the 1980s and 1990s — and another thing altogether to completely ignore such measures. Although in recent years the Reserve Bank has paid less attention to money and credit figures than it once did, the Bank has never ignored them. Over the years the Bank has collected, and will continue collecting, money and credit data. Developments in these data are reported regularly to the Bank's Monetary Policy Committee. And these data have been reported on from time to time in the Bank's publications, such as in *Monetary Policy Statements.*

Nonetheless, even acknowledging the difficulties associated with interpreting money and credit aggregates, it could be argued that the Bank has in recent years accorded too little attention to such aggregates. For example, money and credit aggregates play no explicit role in the Bank's primary macroeconomic forecasting model. Hence they are not forecast nor explicitly incorporated into our inflation projections. Also, while it can be difficult at times to interpret changes in money and credit, it can also be difficult to read signals from the expenditure, output, and price measures we use in forecasting. Like money and credit aggregates, these measures (and

most other macroeconomic statistics) are sometimes revised, may be rather delayed, and often provide conflicting signals. This suggests that it makes sense to use all available inflation indicators, including money and credit aggregates — which is what the Bank essentially does, albeit less explicitly in the case of money and credit data.

In addition, as already mentioned, much recent academic literature suggests a reason to monitor developments in credit aggregates. This literature emphasises the role of credit in the transmission of monetary policy, the so-called "credit-lending channel."[3] Although the literature suggests several specific transmission mechanisms, one of the most important is that associated with balance sheet effects, and especially the effects that monetary policy may have on bank lending. For instance, in response to higher funding costs (possibly resulting from tighter monetary policy), banks can increase loan interest rates, or apply more stringent credit limits, or both. These actions will impinge on the ability of bank-dependent firms to finance their inventories and their ability to undertake capital investment. Similarly, when economic uncertainty raises the risk inherent in lending, banks can either increase lending interest rates to compensate for the additional risk or can tighten their lending criteria. It will be evident from these scenarios that quantitative rationing of bank credit, which is the essence of the "credit-lending" channel, is an important element of the monetary transmission process. In light of this, it makes sense for central banks to track and understand banks' balance sheets.

In this article, we begin to re-examine some of these issues. We focus primarily on just one aspect of the changing views about money and credit aggregates, namely the difficulty of defining and measuring money and credit. We begin by reviewing what theory says about how money and credit aggregates should be defined. We then review how money and credit aggregates are defined in practice. Next, we highlight the difficulties of marrying theory with practice. In particular, we use recent developments from New Zealand to illustrate the effects on money and credit aggregates of the development of new financial instruments, and the availability and use of off-balance sheet instruments such as

---

[3] See for instance Bernanke (1983), Bernanke and Blinder (1988), Kashyap and Stein (1994), Gertler and Gilchrist (1994), and Bernanke and Gertler (1995).

currency swaps.[4] The data uncertainties these kinds of developments bring to money and credit aggregates have, among other things, led central banks to attribute less importance to them. However, in section 5 we present some evidence which suggests that it would be worth re-examining the indicator properties of money and credit aggregates. Even a relatively cursory look at money and credit aggregates suggests that they do provide useful information about economic activity and inflation pressures, and may also give useful signals about stresses in financial markets.

In summary, the preliminary assessment reached in this paper is that it is appropriate to maintain a cautious view about the reliability of money and credit aggregates as **precise** indicators of inflationary pressures. However, **interpreted judiciously**, money and credit aggregates may be useful economic indicators, and hence a useful addition to the central banker's analysis tool-kit.

2 The theory of defining money and credit aggregates

Defining money

Economics textbooks[5] typically define money as:

- a store of value;

- a unit of account; and

- a means of exchange.

Money is said to be a "store of value" in that, in addition to being useful today, it can be used to purchase goods and services tomorrow, next month, next year, and so on. The difficulty with this definition of money, in and of itself, is that many assets other than those commonly thought of as money can serve as a store of value. For instance, stocks and bonds store value. Houses are a very durable store of value – well-built houses are expected to provide shelter well into the future. Consequently, although money is a means of storing value, this definition does not clearly delineate

money from other kinds of real and financial assets.

The "unit-of-account" definition of money arises from the fact that in modern economies **some** asset must serve as a measure of value. The benefit of a unit-of-account measure is in reducing transaction costs. Businesses and households often find it useful to adhere to a standard applied across the entire nation (and in some cases even across the world). For the purposes of weights and distances, most of the world's nations have adopted the metric system. More recently, nations have adopted common standards in the electronics industry, in the development of integrated circuits and in personal computers (especially software). By adopting standards, countries may be able to reduce the costs of "network externalities", which are essentially the higher transaction costs that would be borne if common standards were not in place. With respect to money, by adopting a common unit-of-account, a country dramatically reduces the number of **prices** that businesses and households would otherwise face, and thus reduce the costs of transacting.[6]

Ultimately, it is the monetary unit issued by the central bank that serves as the standard of value. All other monetary liabilities, for example the deposits taken by commercial banks, are anchored to this standard by virtue of the fact that they are convertible into central bank money at par. However, unlike physical standards of measurement, where, for example, a metre and kilogram are uniquely defined with reference to something physical, the value of money is determined only by its rate of exchange with things in general.

The final "textbook" characteristic of money is that it is a means of exchange. To pass this test, an asset must be

---

[4] See the accompanying article in this *Bulletin* by Christian Hawkesby on financial derivative products, of which currency swaps are one variety.

[5] See, for instance, Mishkin (1986).

[6] A simple example illustrates this point. Consider an economy without money – a barter economy in other words. Assume that 10,000 goods and services are traded in this economy. Because there is no money (ie no standard unit-of-account), households and businesses must keep track of the prices of all goods and services in terms of *all other* goods and services (for instance, haircuts in terms of sausages, haircuts in terms of brooms, brooms in terms of shampoo, shampoo in terms of doctor's visits, and so on). In total, for this economy with 10,000 goods and services, households and businesses would need to track nearly 50 million prices (for the arithmetic behind this figure, see Mishkin, 1986). In contrast, if we "invent" money for this economy so that the economy has a unit of account, there will only be 10,000 prices, one for each good in terms of money.

generally accepted as payment for goods and services. Currency meets this standard because it is almost always generally accepted as a means of payment.[7] Cheque accounts also generally fit the bill. However, there are many grey areas. What about credit cards and overdraft limits, for instance? Credit cards are almost universally accepted nowadays, and an unused line on one's overdraft represents purchasing power, which may therefore influence spending.[8]

There are of course other ways to define money. For instance, "money" can be defined to be the "most liquid of assets". An asset is "liquid" if it can be redeemed quickly at a price equal (or quite close) to its face value. Currency is perfectly liquid in that it can instantly be exchanged for goods, services, or other financial and real assets. Likewise, cheque account balances are almost perfectly liquid.[9] Term deposits are less liquid in that they usually have a fixed maturity; that maturity can often be broken, but usually only at an interest penalty. Stocks and bonds are usually thought of as liquid, but their principal value fluctuates. Consequently, stocks and bonds are less "liquid" than currency, and so have a lesser degree of "moneyness."

Another closely related principle for defining "money" is by its substitution properties. Economists say that one asset is a close substitute for another if households or businesses view the two assets as having very similar properties. One could therefore define "money" to be anything that is a close "substitute" for an asset which we are **sure** is money. For

instance, currency and cheque account balances are close substitutes; either can be used to pay for the vast majority of goods and services, or to discharge debts. Unit trusts — especially cash management accounts — are a notable grey area. Cash management trusts are usually very liquid, in the sense that transfers can be made to and from such accounts by phone, and the balance can be redeemed at face value. To date, cash management accounts have been excluded from the monetary aggregates because they amount to very little in New Zealand. However that may not always be the case; if they were to begin growing markedly, the Bank might need to rethink its definitions of money.

In practice monetary aggregates have been defined as the deposit liabilities of banks (currency liabilities of the central bank) and of bank-like institutions. In the last 15 to 20 years, though, this definition has become increasingly problematic. Banks have increasingly come to use off-balance sheet instruments, such as forward and swap contracts. These off-balance sheet contracts can materially alter the picture given by the on-balance sheet information alone.

Another problem area is the wholesale portion of banks' balance sheets. Most central banks construct measures of broad money that include the wholesale liabilities of banks. However, the wholesale portion of banks' balance sheets tends to be rather volatile. Such volatility can easily mask underlying **trends** in the stock of credit or money, in turn making it difficult to infer underlying trends in inflation or the real economy.

One might argue that the latter problem can be solved by stripping out of the monetary aggregates the wholesale liabilities of banks. On this view, a central bank might focus its attention on a "narrow" monetary aggregate such as M1, since it happens that most wholesale funds do not fall within this definition (see box 1 for the definition of M1). Although there is some merit in this view — indeed in section 5 we present some evidence that indicates a marked correlation between growth in New Zealand's narrow money stock (M1) and GDP growth — such an approach could well have problems of its own. In particular, households consider the assets in a narrow aggregate like M1 to be strong substitutes with other assets not in M1, such as EFTPOS-accessible savings accounts. If interest rates rose on

---

[7] However, even for currency there are exceptions. An obvious exception is *foreign* currency. Generally speaking, foreign currency cannot be exchanged for goods and services, unless one first exchanges the foreign currency for New Zealand dollars. It may also be difficult to purchase certain kinds of goods and services with specific denominations of currency. For example, one might find it difficult to use a $100 note to pay for a newspaper.

[8] Indeed, it is not hard to think of cases where credit cards are a better means of transaction than currency itself. For example, suppose one wished to purchase tickets to an All Blacks test match by telephone from Ticketek. In that case a credit card is indispensable.

[9] There are exceptions. Banks do not always make proceeds from deposited checks instantaneously available, especially when large sums are involved. For certain transactions, parties will not accept personal cheques, for example when buying a car. In such instances, even cheques are less than perfectly liquid. In addition, there is always some probability, albeit quite small, that one's bank will become insolvent. If so, it is quite possible that one's cheque account balances would be redeemed at less than face value.

EFTPOS-accessible savings accounts, as would tend to be the case when market interest rates rise, then households would tend to skew their balances away from currency (which has a nominal rate of return of zero) and cheque accounts (which by and large earn low, or no, interest) toward balances not in M1. This kind of substitution can make it difficult to distinguish between movements in narrow aggregates that are associated with changes in interest rates and those that reflect medium- or long-term pressures in the economy.

Defining credit

"Credit" represents loans that have been extended to households, businesses, or the government by banks or other financial intermediaries. Credit thus represents an asset to a bank, and a liability to the household, business, or government receiving the loan. Consequently, for the purposes of measuring "credit" we can focus on the assets of financial intermediaries. In New Zealand, banks are the primary financial intermediaries, and their assets therefore constitute much of the "credit" extended to the private sector.

A defining feature of a loan (credit, that is) is an obligation to pay it off, usually on a given date, and usually (but not always) at a given rate of interest. By definition, then, share market issues are not "credit" because there is no explicit, legal obligation for repayment on a given date. Nonetheless, large corporations weigh the costs of funding inventories and capital improvements via issuance of shares versus borrowing. This means that "credit" markets and share markets are to some extent substitutes. If the costs of funding through the share market become relatively inexpensive, such as when the share market is advancing briskly, large corporations will tend to favour new share issuance as a means of obtaining capital. When interest rates are relatively low, large corporations may rely more on credit markets, either by borrowing from their banks, or by tapping the credit markets directly by issuing debt securities. As a result, credit aggregates, measured as the assets of banks, may at times be susceptible to the same kinds of substitution effects that can plague monetary aggregates. In an open economy like New Zealand, a further complication is the significant degree to which large corporations can switch their borrowing from domestic to overseas loans.

Perhaps most important, though, credit aggregates can be greatly influenced by restructuring of the financial sector and by development of new financial instruments. One notable development is "securitisation". Although we go into the details of securitisation in section 4, for the moment it suffices to point out that securitisation **reduces** the assets and liabilities on banks' balance sheets, and thus reduces **measured** levels of money and credit. However, there is no change in total credit extended to the economy.

The upshot of all this is that there is no one "best" definition of money, or of credit. As a rule, central banks the world around have had to balance theory against practicalities in constructing money and credit aggregates. For the most part this has resulted in a common approach of aggregating the liabilities of banks, including the currency liabilities of the central bank, for money, and the assets of banks for credit measures. Institutions outside the banking sector are generally regarded as less monetary in character.

Following this general approach, most central banks have constructed an array of money and credit aggregates. Financial assets (bank liabilities, that is) that are thought to be equally liquid, or highly substitutable for one another, are pooled in common money aggregates. Narrow-money aggregates are typically thought of as the most liquid and therefore the most "money-like" aggregates; broader-money aggregates are correspondingly less liquid and are therefore less "money-like". Similarly, on the credit side of the balance sheet, a distinction is generally drawn between credit extended to the private sector and credit extended to the government.

This common approach to money and credit aggregates has much to recommend it. Although not theoretically perfect, it is simple and easily understood. This approach is also in keeping with those of most other central banks and that advocated by the International Monetary Fund. Consequently, it allows comparability of the growth rates of New Zealand's monetary aggregates with those of other countries.

Box 1: RBNZ definitions of money and credit

Definitions of money

The Reserve Bank defines "money" as the sum of New Zealand notes and coin in the hands of the public, plus New Zealand dollar-denominated deposits of "M3 institutions". There are 17 of these — the largest banks, subsidiaries such as finance companies, and one building society. To keep matters simple, in this article we refer to these seventeen entities as 'banks'.

The Bank has defined three measures of "money":

M1 = cheque account balances, whether wholesale or retail (about 85% of M1) and notes and coin in the hands of the public. M1 averaged $12 billion in 1998.

M2 = M1, plus all other deposits that are available 'on demand', business or personal. M2 averaged $35 billion in 1998.

M3 = M2 plus banks' term funding.[10] M3 averaged $93 billion in 1998.

Resident M3 (M3R) = M3 less New Zealand dollar funding sourced from non-residents. M3R averaged $79 billion in 1998.

Definitions of credit

PSC (Private sector credit) = all bank loans to the private sector (all borrowers except central government), and banks' holdings of commercial paper issued by businesses. PSC averaged $108 billion in 1998.

PSCR = PSC minus New Zealand dollar loans to non-residents. PSCR averaged $104 billion in 1998.

DC and DCR (Domestic credit) = PSC (and PSCR) plus bank claims on government, which are mostly represented by banks' holdings of government bonds and Treasury bills. These aggregates averaged $116 billion and $111 billion respectively in 1998.

On the downside though, the central bank may need to stand ready to revise definitions of money and credit in response to financial innovation. Also, the central bank must be constantly on guard against too readily attributing movements in money and credit aggregates to business cycle pressures. Swings in money and credit may reflect inflation or real-side developments, but they may also reflect structural changes such as the arrival and use of new financial instruments, or changes in interest rates (both foreign and domestic), or simply volatility in wholesale financial markets. In real time, it may be difficult to parse out these effects with the degree of precision one would like.

---

[10] Term funding includes instruments called 'Bonus Bonds', created under legislation for issue by the Post Office Savings Bank (POSB). They are akin to certificates issued by a cash management trust, and are now available through the bank that subsequently bought the POSB. Bonus bonds bear no interest, but participate in a monthly lottery that allocates the yield on the trust's assets as tax-free prizes. The amount on issue is about 2% of M3.

3 How the Reserve Bank defines money and credit: the balance sheet approach

We now turn to the specific definitions used by the Reserve Bank to construct New Zealand's money and credit aggregates. In the simplest terms, the New Zealand Dollar (NZD) liabilities of commercial banks and of the central bank constitute money, and their NZD assets constitute credit, either to the private sector or to the government. Banks are intermediaries that match lenders with borrowers. This depositor/borrower nexus underscores the necessity of a close, although not necessarily perfect, correspondence between definitions of money and credit.

To aid in the following discussion, table 1 shows three "T-accounts." The T-accounts are simplified balance sheet representations of the key liabilities and assets of banks' balance sheets. The first two columns in the table show the

Table 1: "T-accounts" for commercial banks and Reserve Bank

Ref	Consolidated banking system — Liabilities	Consolidated banking system — Assets	Banks — Assets	Banks — Liabilities	Reserve Bank — Liabilities	Reserve Bank — Assets
A1	Notes and coin in the hands of the public		Currency holdings		Currency on issue	
			Deposits at Reserve Bank	Borrowing from Reserve bank	Deposits from banks	Lending to banks = 0
A2	Transaction (cheque) deposits			Transactions (cheque) deposits*		
A3	M1 = A1 + A2					
A4	Other on-demand deposits			Other on-demand deposits*		
A5	M2 = M1 + A4					
A6	Term deposits		Inter-bank lending	Term deposits*		= 0
				Inter-bank borrowing		
A7	M3 = M2 + A6					
B1		Private sector loans/ investments	Private sector loans/Investments*			
B2		PSC (private sector credit) = B1				
B3		Net claims on government	Government security holdings	Government deposits	Government deposits	Government security holdings, lending to Govt
B4		DC (domestic credit) = PSC + B3				
B5		Net foreign assets	Foreign currency assets	Foreign currency funding	Foreign currency funding	Foreign currency assets
B6		Net other assets	Other assets	Other liabilities / Capital and reserves	Other liabilities / Capital and reserves	Other asset
B7	DC + B5 + B6 = M3		Total assets	Total liabilities	Total liabilities	Total assets

* All net of inter-bank, government and foreign currency items.

consolidation of New Zealand's banks (ie the balance sheets of all M3 institutions taken as a group) with the balance sheet of the Reserve Bank. The middle two columns show the combined balance sheet of M3 institutions (denoted "Banks"). The last two columns depict the balance sheet of the Reserve Bank.

As can be seen from table 1 (and box 1), there are a number of organising principles for the money and credit aggregates. These are that:

- Money is defined as the deposit liabilities of banks plus the currency liabilities of the central bank in the hands of households and non-bank businesses. The idea here is that it is businesses and households that respond to changes to the availability of money and credit (in a way that does not apply to the government). For the purpose of analysing inflation and the real economy, money and credit represent the "spend-able" balances of (or credit extended to) businesses and households and this is taken into account in assessing developments in, and prospects for, the private sector of the economy.

- Money is defined in terms of NZD-denominated assets. Foreign currency deposits held at New Zealand banks are not part of our money stock. The reasoning behind this principle is that (a) foreign currency is not legal tender in New Zealand; and (b) in practice, payments for goods or services purchased in New Zealand must be made in New Zealand dollars.[11]

- An attempt is made to put items with a similar degree of "moneyness" in the same monetary aggregate. Thus, currency and cheque balances are placed in the aggregate M1. Term deposits, whether attributable to retail or wholesale customers, are placed in M3.

- Finally, in order to avoid double counting, the liabilities (for money stock measures) and assets (for credit measures) of banks are consolidated. In other words, the balance sheets of all of New Zealand's banks (the Reserve Bank included) are added together, and any amounts the banks owe to each other are excluded.

---

[11] There are probably a few very minor exceptions to this rule. For instance, retail outlets frequented by a large number of tourists might accept foreign currency in direct payment for purchases.

Money

The Reserve Bank compiles and publishes three main monetary aggregates: M1, M2, and M3 (see box 1 and table 1). Lower numbered aggregates (M1) are typically thought of as the most liquid and therefore most money-like aggregates; higher numbered aggregates are correspondingly less liquid and therefore have a lesser degree of "moneyness."

M1 (table 1, A3) consists of notes and coin and chequeable balances. These are the financial assets that historically have been the most readily acceptable as a means of payment in New Zealand. Cheque balances are almost uniquely held in banks. The governments' main bank account is with the Reserve Bank, but it also holds small working balances with commercial banks. However, the organising principle that we should measure the money balances of the "non-bank public" means that government balances are excluded from the monetary aggregates.

The organising principle that "money" is defined in terms of deposits and currency in the hands of the non-bank public has a few implications. First, as can be seen in the table, notes and coin are the only elements of the Reserve Bank's balance sheet that are part of the definition of money (A1).

M2 (A5) consists of M1 plus other other "on-demand" balances, including EFTPOS-accessible savings balances. Non-chequeable but EFTPOS-accessible savings accounts are only slightly less liquid than cheque account balances. Some twenty years ago, before the advent of EFTPOS, passbook savings accounts for personal customers were the next most liquid bank balance after cheque accounts. Nonetheless, such accounts were accessible only during banking hours (which were more limited than now), and thus were not readily available for transactions. Moreover, to be used in transactions, these balances first had to be withdrawn either as currency or transferred to a cheque account. As technology improved, passbooks went out of fashion, and most of these accounts became EFTPOS-accessible. All things being equal, this would suggest that such balances are now perhaps just as liquid as cheque balances. However, to encourage their use as savings vehicles, banks apply interest rate penalties to most EFTPOS-accessible savings accounts, and also higher withdrawal fees than for cheque accounts. In addition, anecdotal evidence indicates that the EFTPOS

option on such savings accounts is not as widely used as it is on cheque accounts. For these reasons, we do not include these balances in M1. In addition to EFTPOS-accessible savings accounts, M2 includes other "on-demand" deposits of businesses and non-profit organisations. In this sense, New Zealand's measure of M2 is not a "retail" or "small deposit" concept.

M3 (A7) consists of M2 plus term funding. Interbank deposits, which are deposits banks have placed with each other, are excluded from M3, reflecting the organising principle that we are interested in balances of the **non-bank** public. Term deposits (A6) constitute the majority of M3, for instance comprising on average over 60% of M3 in 1998. More than half of the term deposits in M3 are retail, predominantly personal and maturing within a year. Term deposits are paid the highest interest rates by banks and have, in the 1990s, grown the most rapidly of any major component of M3.

For the purpose of understanding spending proclivities of residents — who are after all more likely to influence domestic prices — it may make more sense to exclude from money and credit measures the balances of non-residents. Accordingly, in addition to M3, the Bank compiles money aggregates net of balances attributable to non-residents; this is called M3R (not shown in table 1).

We next turn to the matter of foreign currency funding and assets and liabilities attributable to non-residents. As noted, the Bank, like other central banks, relies on the organising principle that money should be defined in terms of domestic currency, in our case New Zealand dollars. Unlike some countries, though, the balance sheets of our banks reveal very substantial foreign currency deposits. Closely related to banks' foreign currency funding is funding from non-residents. The bulk of the foreign currency funding of New Zealand's banks is attributable to non-residents, including to a notable extent their offshore affiliates. Funding from non-residents (in both domestic and foreign currencies) is significant, at the moment totalling roughly one third of banks' total funding (net of inter-bank deposits).

Credit

The Reserve Bank compiles four main credit aggregates: private sector credit (PSC), domestic credit (DC), private sector credit to residents (PSCR), and domestic credit to residents (DCR).   The loans of New Zealand banks to the private sector constitute private sector credit (PSC, line B2). The loans of banks to each other are excluded from this aggregate in view of the organising principles. For the same reason, credit extended by New Zealand banks in foreign currency does not feature in PSC. A small proportion of bank assets, currently less than five percent, is made up of government securities. These loans to government, plus those of the Reserve Bank, net of the Government's deposits with the banking system, when added to PSC make up domestic credit (B4).

In addition to monitoring these four credit aggregates (PSC, DC), the Bank also closely monitors some of their components. For instance, the Bank tracks the lending of banks to non-financial businesses such as the forestry sector, the retail sector, and so on. These figures may help the Bank better understand whether the lending of banks is being used, for instance, to fund stocks, to make major capital investments, and so forth.

The Bank also tracks separately the borrowing of households. Household borrowing may fuel purchases of durable goods and housing. In addition, it may reveal information about households' confidence about the economy. To get a more accurate reading of borrowing by households, the Bank boosts the sample size used for the aggregates by conducting a supplementary survey. This survey supplements the household sector lending information obtained from the M3 group of institutions with the total of loans to households by a smaller, specialist household sector lending group. This supplemental survey also tracks household loans that have been securitised.

Box 2: Recent improvements to the money and credit aggregate data

In June 1998, the Bank revamped its monetary aggregates survey. Prior to that we collected monthly deposit and loan amount information from the balance sheets of over 45 respondents. Most of them were non-bank financial institutions, and were quite small (for instance, some had total assets of less than $100 million in a banking sector with $140 billion worth of assets). The revised survey reduced the number of respondents to just the seventeen largest financial institutions. This helped reduce costs of collecting and compiling the data, but with very little loss of information. It also enabled us to publish the results of the survey on average two weeks earlier than before, and with fewer reporting errors requiring subsequent revision. The loans and deposits of the current survey comprise over 95% of the corresponding totals of the Bank's previous broader survey.

The bank has also been engaged in significant efforts to improve the quality of the money and credit aggregates. A number of projects have been completed, and a number are still underway, centred around the revision to the survey of bank balance sheets that provides most of the data currently collected. To some extent the improvements made, and research into the possibility of further improvements, reflect our improved understanding of how technicalities of the banking system may affect the money and credit aggregates. This box describes in detail some of these technicalities. It also describes some of the changes that have been made to the money and credit aggregates to accommodate them. Finally, the box indicates some areas for future work.

Continuity in data series

The Bank strives to maintain data series on a consistent basis. Significant changes in market practice or composition usually require revisions to time series data. As part of the aggregate series revision in 1998, we recompiled a consistent data series as far back as 1988, using the available data on individual banks. It was, however, necessary to pro rate some data from the earlier series, and to reconstruct elements of some balance sheets. In particular,

we brought more accurately into the PSC definition the loans of the Housing Corporation prior to its formal introduction into the money and credit aggregates in 1992, when its residential mortgage loans were about 15% of the household loan market and 7% of PSC. Also, M1 data has been reviewed and revised to obtain a more consistent data series. This required some institutions to review records. Estimation of some data points was necessary. The outcome of the revision is a ten year monthly data series of better quality than previously, which will shortly be published on the Bank's website. For the first time we also have a weekly aggregate data series drawn from the full monthly survey population. Work is ongoing to apply estimation techniques to the weekly data to overcome some of the problems in reconciling weekly with monthly data, in order to provide weekly aggregate series suitable for research purposes.

Seasonal adjustment

We rigorously tested the revised series for seasonality, and, as a result, ceased publishing monthly seasonally-adjusted data for most aggregates from January 1999. We had been aware that over time, because of behavioural and structural changes in the economy, the degree of seasonality had declined in most of the aggregate series which we had been seasonally adjusting. However, using the revised series, we found a stable pattern of seasonality only for currency and, to a lesser extent, M1.

Richness of data

The survey that collects data for the aggregates is called the *Standard Statistical Return* (SSR). It obtains over two hundred data items from bank balance sheets. Fewer than thirty of these are used to compile M3 and PSC. Remaining items are incorporated in a number of published subsidiary tables, for example, those used to track the lending of banks to various sectors of the economy. Particular attention has been given to improving the consistency of the allocation of bank lending to economic sectors. In another new development the SSR, as revised last year,

introduced funding and claims tabulations compiled using financial market terms such as 'promissory notes,' 'commercial bills,' 'personal overdrafts.' These enable the formal collection of bank claims in PSC to be correlated with the more informal market terminology usually used by industry commentators to describe activity. They add richness and wider comprehension to the information collected. It is not always possible to reconcile formal generic balance sheet descriptions, used conventionally for aggregates, with the product descriptions of banks, but in consultation with the market we decided the value in obtaining a richer picture warranted a less conventional collection.

Defining cheque and EFTPOS-accessible balances

The revision to the SSR necessitated redefinitions of M1 and M2. We have redefined cheque balances to be those on which depositors can **in principle** write a cheque. It is of course possible that a particular depositor may never write a cheque against a certain account, relying instead solely on EFTPOS for transactions. Still, if this particular depositor could in principle write a cheque against this account, the account is called chequeable. In a similar fashion, balances in the "EFTPOS excluding cheque" deposit category in M2 include those accounts that can be accessed by EFTPOS, even if the account holders have chosen not to activate the EFTPOS.

Inter-bank borrowing/lending

Until we revised our aggregate series, we obtained from banks a record of both their loans to other banks in the survey and their funding (the reciprocal item), in order to net interbank deposits and lending to compile aggregates correctly. However, banks obtain much of their interbank funding by issuing certificates of deposit and other tradable commercial paper. Therefore, while a bank knows which party originally bought its certificate of deposit (CD), it may be onsold, making it difficult to know subsequently who the holder is. On the other hand, each bank is easily able to report its loans to other banks (in this sense,

others' CDs in their portfolio). These loans of course are the counterpart of the deposits we want to identify. Formerly, the two couldn't be reconciled in practice because of the 'onselling' problem, and we published a 'discrepancy'. As a result of the thorough going review of data and procedures we can now simply net using the lending figure, since it must, by definition, equal the correct deposit total.

Netting and set-off

Banks have traditionally offered business customers a facility whereby the loans drawn as overdrafts on some of the accounts in a multiple suffix chequing account are 'set off' against deposits in others. This procedure reduces the (debit or credit) amount recorded on the balance sheet, and accordingly M3 and PSC. Improvements in information technology have made it possible to extend this technique and to market it to customers more widely. This will erode M3 and PSC totals, to a relatively unknown degree. New legislation providing greater legal security for a wider application of the netting principle[12] may in time extend this impact. While we can monitor the use of netting, its impact cannot be quantified.

---

[12] See DeSourdy (1999).

4 Recent examples of the influence of structural change on money and credit aggregates

This section presents some recent examples from New Zealand of just how difficult it can be at times to marry theory and practice in defining money and credit. For example, the development of new financial instruments can greatly affect the measurement of money and credit. Restructuring of the banking system might also have important effects. **Off-balance sheet** items such as foreign exchange swap contracts may have important influences on measures of money and credit. The examples highlight the fact that policy-makers must exercise considerable judgement in interpreting money and credit figures when financial markets are evolving rapidly.

Repurchase agreements (repos)

In the second half of 1998 measures of bank lending sent conflicting signals about the strength of the economy. Private sector credit (figure 3, red line) grew at a fairly constant rate throughout much of 1998, advancing at an average annual rate of 8.5 percent in the first three quarters of the year, but then decelerated sharply in the last quarter. On the face of it, this deceleration might have been read as indicating a drop in demand for credit, and thus possibly suggesting continuing weakness in the overall economy. In contrast, lending to New Zealand residents (as measured by PSCR) accelerated sharply from the second quarter of 1998

Figure 3:
## Growth rate of selected measures of bank lending, (annual rate)
Source: RBNZ

(figure 3, blue line), suggesting that demand for credit was rebounding with the economy.

For the most part, the break in the pattern between PSC and PSCR, and certainly the deceleration in PSC in the fourth quarter of 1998, was due to factors related to the appetite of foreign investors for NZD-denominated government bonds, rather than to events related to the domestic economy. Earlier in 1998 foreigners bought NZD-denominated bonds, which they often financed by executing repurchase agreements (repos) with New Zealand banks. Repos are akin to collateralised loans by New Zealand banks to foreign brokers, dealers, and banks: the borrowers place the NZD-denominated securities as "collateral" with the New Zealand banks which have "lent" them funds. Although the extension of repos by NZ banks boosts the size of their balance sheets, and thus PSC as well, to the extent the repos are executed with foreigners they do not factor into PSCR. In the fourth quarter of 1998 the outstanding amount of repos executed with foreigners dropped markedly (pushing down the growth rate of PSC) because of a diminished appetite on the part of foreigners for NZD securities. This diminished appetite was reportedly associated with the unsettled financial market conditions following the default of the Russian government and the near-collapse in the US of Long Term Credit Management, a US hedge fund.

The conflicting signals being sent by PSC and PSCR in the second half of 1998 would seem to have been meaningful and informative. In the second half of 1998 the Bank judged that the economy was rebounding, following two quarters of negative growth in the first half of 1998. The pick-up in PSCR certainly supported that view. At the same time however, in the last few months of 1998 the Reserve Bank was quite concerned about the potential for global financial events (and what they might imply for overseas economies) to short-circuit New Zealand's economic recovery. And PSC growth, the repo-inclusive measure of credit, which was slowing, reflected the sharp global retrenchment in financial markets. Thus, in some sense, PSC and PSCR, though sending apparently conflicting signals, were in fact reflecting two very different but important factors relevant to policy makers.
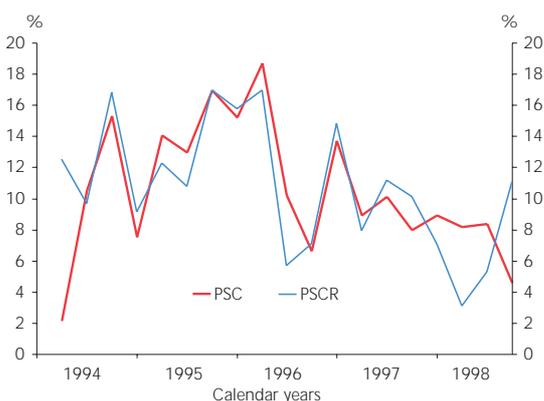
With an eye toward the future, for the purpose of thinking about the strength of the domestic economy, it is probably preferable to focus on PSCR. The non-resident component of PSC is relatively small but volatile. It primarily reflects repo "lending" by New Zealand banks to non-residents. In the main, these non-residents are banks and other financial institutions (such as brokers and dealers) who are very sensitive to interest rates at home and abroad. Consequently, small changes in interest rates may lead to relatively sizeable movements in repos, and hence in PSC. This also suggests that it might be helpful to focus on an aggregate which nets out the repo activity of banks. The Bank began compiling such a measure in mid-1998, and has back-dated it one year.

Foreign currency funding

As can be seen in table 2, in the second half of 1998 movements in the various money and credit aggregates were confused (and confusing). Broad money, M3 and M3R, contracted in the last two quarters of 1998, and that might have been read as indicating either that the economy was not rebounding as the Reserve Bank expected, or perhaps that turbulence in world financial markets was somehow depressing liquidity in New Zealand. In contrast, as noted above the growth rate of PSCR rebounded sharply in the second half of 1998, pointing in the direction of a rebounding economy.

Table 2:
Growth rates of selected money and credit aggregates,* (annual rates)

Source: RBNZ

Period	M3	M3R	PSC	PSCR
1994	5.7	6.3	13.4	12.6
1995	13.3	12.4	13.5	12.8
1996	13.3	12.6	13.3	11.8
1997	4.8	5.6	10.6	11.5
1998	2.4	1.8	7.7	6.8
1998:Q1	8.3	10.2	8.9	7.1
1998:Q2	11.1	3.7	8.2	3.1
1998:Q3	-4.4	-4.4	8.4	5.3
1998:Q4	-5.4	-2.1	4.6	11.0

* **Figures for years 1994-1997 are 4th quarter over 4th quarter growth rates computed from quarterly averages of monthly levels. Figures for 1998 are quarter over quarter growth rates computed from quarterly averages of monthly levels.**

This divergence was attributable primarily to an increase in the foreign currency funding recorded by New Zealand banks. As pointed out in section 3, money and credit aggregates include only local-currency-denominated items and are based **solely** on balance sheet information. We also know however, that virtually all of the foreign currency funding raised by New Zealand banks is swapped into New Zealand dollars. However, under generally accepted accounting principles, the swap transaction (which is described in more detail below) that converts the foreign currency funding into NZDs, is recorded "off-balance sheet". The conventional framework for compiling monetary aggregates does not take account of these off-balance sheet items. If they were taken into account in the monetary aggregates, then most of what currently appears on New Zealand banks' balance sheets as foreign currency funding would be relabelled as NZD funding, and as such would be brought into the M3 monetary aggregate for New Zealand (but not the M3R aggregate, given that the source of funds is non-residents). In a similar vein, some have argued that off-balance sheet items may be contributing to a deterioration in the accuracy and meaning of balance of payment capital account and current account figures around the world (see Garber, (1998)).

At a more general level, lying behind the growth of foreign currency funding has been increased integration of New Zealand financial markets with global financial markets, which again illustrates how financial liberalisation and innovation require judicious interpretation of money and credit aggregates. Following the removal in the mid-1980s of impediments to financing transactions between New Zealand and other countries, New Zealand's banks have increasingly regarded themselves as having access to a global market for funds. At the same time, overseas capital markets have been coalescing into a single, global market for capital. This has made it possible for New Zealand banks at times to raise funding more cheaply offshore than onshore. The outcome has been that New Zealand banks these days look more to the international capital markets as a source of funds than they used to.

One key development that has made this integration of international capital markets possible is the expansion of the foreign exchange swaps market. A foreign exchange swap is a transaction in which the respective holders of two differ-

Table 3a:
Stylised balance sheet for bank

Bank XYZ			
Liabilities		**Assets**	
Deposits	90	Loans	100
Capital	10		

Table 3b:
Stylised balance sheets for bank that securitises assets and investor who buys asset-backed securities

Bank XYZ					Non-bank investor			
Liabilities		**Assets**			**Liabilities**		**Assets**	
Deposits	80	Loans	90		Capital	10	Asset-backed securities	10
Capital	10							

ent currencies exchange the currency they each hold with the other by way of back-to-back, essentially reciprocal, transactions (which are bundled into a single transaction). In other words, they swap the currencies they hold for a defined period. This makes it possible for a bank with a need for NZD funding to obtain funding offshore and then convert the proceeds into NZDs. The combined effect of the foreign currency borrowing and the swap transaction is that the New Zealand bank has boosted its NZD funding, albeit indirectly.

Securitisation

Banks in foreign countries, and increasingly in New Zealand, have begun to securitise loans. Securitisation is the process of bundling similar loans together into a "parcel" and using them to "back" securities that are sold to third party investors, who are often non-bank financial intermediaries.[13] Most commonly, housing loans secured by residential mortgages are used to back these securities. The effect of securitisation is to remove some of the loan assets from the balance sheets of banks, thus shrinking the size of banks' balance sheets, which in turn reduces measured levels of money and credit. However, the total supply of credit to the economy is

unchanged. During a period of large scale securitisation, a naive reading of money and credit aggregates might therefore suggest a slowing of either the economy or inflation. But such a reading would be incorrect.

To illustrate these points, consider table 3a, which presents a highly stylised balance sheet for a bank. The bank has capital of $10 and has taken $90 in deposits. It has used the total of $100 to fund loans to the private sector. This bank's contribution to the money supply is $90 (its deposits), and its contribution to private sector credit (PSC) is $100.

Now suppose that the bank decides to securitise some of its loans (table 3b). The bank packages $10 of its loans as collateral to back a security (an asset-backed security). An investor buys $10 of securities backed by the bank's loans. The bank's loans fall by the $10 of loans that were "securitised" to $90 (the blue-shaded cell in table 3b). The bank's deposit liabilities fall from $90 to $80, as shown in the red-shaded cell. Because the assets and liabilities of the non-bank investor are not included in measured money and credit aggregates, the overall effect is to reduce measured money and credit by $10 each. However, as should be obvious, total credit that has been extended to the economy is unchanged. Thus, although measured money and credit have fallen, there is no substantive implication for monitoring of inflation or the strength of the real sector.

To date, securitisation has been a relatively limited phenomenon in New Zealand. Most likely, it has therefore had a minor cumulative effect on money and credit aggregates. Nevertheless, securitisation is likely to proceed apace, and

---

[13]   One reason a bank might securitise loans is to bolster its prudential ratios. Banks are required to carry capital in proportion to the value of their assets (with the proportions varying by specific kinds of assets). If a particular bank had too little capital relative to its prudential requirements, it could either find more capital or shed some assets. Since capital is costly, the bank might find it cheaper to shed some of its assets through securitisation. With its capital at a constant level, and its assets falling, the bank's capital ratio would rise.

the Bank has been, and intends to continue, closely moni-toring such activities to ensure that money and credit aggregates can be correctly interpreted.

5 So can we make *anything* of money and credit aggregates?

At this point, one might ask: Given the myriad of ways that money and credit aggregates can be influenced by defini-tions, by financial innovation and restructuring, and so forth, can we make **anything** of money and credit aggregates as economic indicators? Perhaps contrary to what one might have assumed on the basis of the foregoing sections, one need not look **too** hard to find reasonable evidence that money and credit aggregates may prove useful in gauging inflation and the developments in the real sector.

For instance, figure 4 plots the growth rates of GDP (blue line) and M1 (red line). The two series do not always move together, and GDP growth sometimes leads money growth, while sometimes the reverse is true. Nevertheless, the cor-relation between the two growth rates is striking enough to suggest that further investigation would be useful.

Figure 4:
Growth rates of GDP and M1, (annual rate)
Source: RBNZ and SNZ
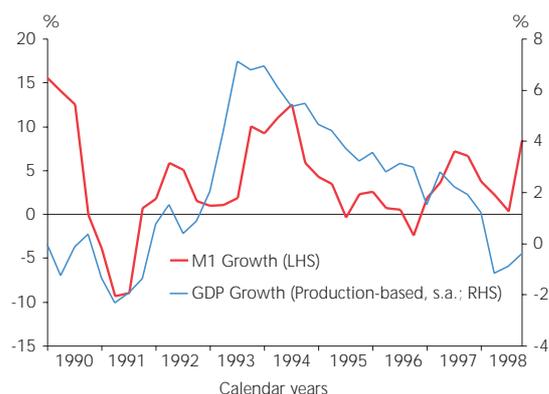
It is not too hard to find meaningful correlations on the credit side as well. In previous sections, we suggested that **PSCR** might reasonably be expected to be correlated with the strength of the domestic economy. In fact, we can do even better if we consider only lending to households, which is extracted from PSCR and the supplementary survey. As the demand for housing rises, say in response to a rebound in

the economy, house prices may rise. It seems reasonable to expect that, roughly in parallel, banks will be extending new loans to households to meet the demand for new mortgage loans. Consequently, house prices and bank lending to households may rise in tandem. To the extent that this is true, bank lending to households may be a useful indicator of house price inflation, which would be particularly helpful to the Reserve Bank given that the housing market has in the past been an important source of inflationary pressures. Figure 5 plots the growth rate of lending to households against the percent change in house prices. As can be seen, lending to households is strongly correlated with house price inflation, suggesting that it is worthwhile to monitor lend-ing to households for indications about the housing market.

Figure 5:
Growth rate of loans to households and house price inflation, (annual rate)
Source: QVNZ, RBNZ.
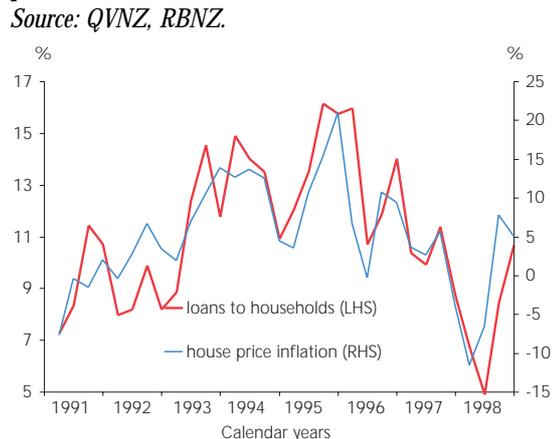
Note: Loans to households is from RBNZ *Financial Statistics*, table C10. "House price inflation" is measured as the quarterly percentage change (at an annual rate) in *Quotable Value New Zealand's (QVNZ)* overall quarterly house price index.

At a more general level, collecting bank balance sheet data (and using it to construct and monitor money and credit aggregates) is one way a central bank can keep its finger on the pulse of the financial sector. Banks impose credit limits even for their most credit-worthy customers. They do so because there is always a possibility that a borrower may default, and because the likelihood of default may **rise** if the bank demands too high an interest rate to compensate for above-average default risk. That alone suggests that de-velopments in financial **quantities** – such as the growth rates of money and credit – may provide information about

developments in the real sector over and above that provided by financial market prices or other economic indicators.

In addition, there is a growing awareness that central banks need to be cognisant of potential dangers posed by rapid credit expansion if it leads to asset price inflation. When a rapid rise in asset prices is due to overly exuberant expectations, a collapse in those expectations as the result of an adverse shock could cause asset prices to fall sharply, depressing wealth and consumption, and possibly leading to outright recession. An important factor in this chain of events is that collapsing asset prices may wreak havoc on the balance sheets of corporate or financial businesses. For instance, when asset prices fall businesses (both financial and non-financial) may find that the value of the collateral they have pledged against loans is shrinking. That will make it more difficult for those businesses to obtain loans, or to roll over existing loans. At the same time, with asset prices falling, leveraged investors may face margin calls on their investments. In the rush to meet margin calls, borrowers may face requests for more security cover, initiating a kind of vicious circle. A notable feature of these kinds of cycles is that banks may become extremely cautious about lending. In respect of this article, the main point is that these kinds of developments are closely linked to **balance sheet** (or off-balance sheet) factors. Because money and credit aggregates are, at root, balance sheet concepts, in such instances measures of money and credit might usefully supplement other financial and real side indicators of the strength of the economy.[14]

Finally, there may be secondary benefits to monitoring money and credit aggregates. We have suggested that tracking money and credit aggregates may be one way for the central bank to keep its finger on the pulse of the financial sector. And, in general, to the extent that the central bank can better understand linkages and feedbacks between the real and

financial sectors, it may be better equipped to fulfil its mandate, in the case of the Reserve Bank of New Zealand, controlling inflation and promoting a sound and efficient financial system. Indeed, central banks have traditionally had responsibility for monitoring the health of the financial sector in order to help guard against systemic risks. Monitoring the size, composition, and quality of the balance sheets of banks (and other financial institutions) thus goes hand-in-hand with one of the tasks typically assigned to the central bank.

6   Where to from here with money and credit?

On balance, despite the difficulties associated with defining and measuring money and credit, their role in policy-making seems worth re-examining. Two areas of research might be considered.

First, because the Bank has recently put little weight on money and credit aggregates as indicators – either of inflation (or inflation pressures) or of real sector developments – it might be worth re-examining the evidence. At a minimum, the very cursory look presented in this paper (figures 4 and 5) suggests that a closer look would be appropriate. One important aspect would be to consider the indicator properties of a range of measures of banks' balance sheets (such as lending to households, or credit net of repo activity), in addition to the more traditional money and credit measures.

Secondly, it might be useful to re-examine the links among money, credit, the financial sector, and the real economy at a more general level. For instance, it might pay to think about the role of money and credit in macroeconomic models. Macroeconomic forecasting models in use around the world often have little explicit role for the financial sector, at least once an interest rate and the exchange rate are taken into account. In particular, the levels of money and bank lending often play no role.[15] There may be several reasons for this. First, it could be that the kinds of definitional issues outlined in this article have made central banks extremely

---

[14]   Some have suggested that a central bank should be on guard when money is growing rapidly *even* if the overall inflation rate is in check (see for example, the views in *Federal Reserve Bank of Cleveland Annual Report, 1998*). Fundamentally, it is argued, too rapid growth in money is inconsistent with a low and stable inflation rate. But, an acceleration in money growth may take some time to show up in overall inflation, either because of lags, or because of special factors, such as declining oil prices or an appreciation of the exchange rate that depresses the prices imported goods.

[15]   See, for instance, Laidler (1999) for a discussion of this issue, albeit from a slightly different perspective.

wary of money and credit aggregates. Secondly, one genre of economic literature – the "real business cycle" literature – has literally argued that business cycles are caused entirely by shocks from the real side of the economy. If so, that would mean that the monetary side of the economy is largely incidental, and for many purposes can simply be ignored. Thirdly, it could be that the financial sector is thought to act importantly on the real sector (and thus on inflation) only in times of financial crises, such as during an exchange rate crisis. If so, for forecasting purposes, it might make sense to ignore the financial sector in all but exigent circumstances. Fourthly, although some economists have long thought that the size and health of the balance sheets of financial intermediaries (and businesses) do influence the real economy over and above that captured by financial market prices (for example, see Fisher, 1933), until relatively recently there has been a paucity of analytical models that introduced feedbacks from the balance sheets of financial institutions (and businesses) to the real sector.[16] Fifthly, there may be recognition and implementation lags. Because it is only relatively recently that explicit models of financial crises and feedbacks from the financial quantities to the real sector have emerged, there may have been too little time to digest these new models fully, to test them, and if appropriate, put them into place.

It would be worth considering whether any of the newer models that introduce balance sheet effects and feedbacks could help us better understand New Zealand's real sector and inflation developments. It might be difficult to incorporate such frameworks into macroeconomic forecasting models. But they may highlight reasons to monitor and understand developments on the balance sheets of financial institutions, and in particular to track developments in money and credit, the quality of bank loans, the health of borrowers' balance sheets, and so forth.

---

[16]   For one such model, the so-called "financial accelerator" model, see Bernanke et al. (1996, 1998). Another rather different genre of models are the so-called "limited participation" models, such as Fuerst (1992) and Christiano and Eichenbaum (1992).

References

Bernanke, B (1983), 'Non-monetary effects of the financial crisis in the propagation of the Great Depression,' *American Economic Review,* June, 73: 257-76.

Bernanke, B and A Blinder (1988), 'Credit, money and aggregate demand,' *American Economic Review*, May, 78: 435-9.

Bernanke, B and M Gertler (1995), 'Inside the black box: the credit channel of monetary policy transmission,' *Journal of Economic Perspectives*, 9(4): 27-48.

Bernanke, B, M Gertler and S Gilchrist (1996), 'The financial accelerator and the flight to quality,' *Review of Economics and Statistics,* Feb, 1-15.

Bernanke, B, M Gertler, and S Gilchrist (1998), 'The financial accelerator in a quantitative business cycle framework,' NBER Working paper, no. 6455.

Christiano, L and M Eichenbaum (1992), 'Liquidity effects and the monetary transmission mechanism,' *American Economic Review*, 82, 346-353.

DeSourdy, L (1999), 'New legislation for netting and payments finality,' Reserve Bank of New Zealand *Bulletin*, vol 61, no. 2, June, 61-65.

Federal Reserve Bank of Cleveland (1998), *Annual Report, 5-12.*

Fisher, I (1933), *Booms and depressions.* London: George Allen and Unwin Ltd.

Fuerst T (1992), 'Liquidity, loanable funds, and real activity,' *Journal of Monetary Economics*, 29, 3-24.

Garber, P (1998), 'Derivatives in international capital flow,' NBER working paper, no. 6623.

Gertler, M and S Gilchrist (1994), 'Monetary policy, business cycles, and the behaviour of small manufacturing firms,' *The Quarterly Journal of Economics,* 59(2): 309-340.

Kashyap, A, and J Stein (1994), 'Monetary policy and bank lending,' *Monetary Policy*, National Bureau of Economic Research Studies in Business Cycles, vol. 29. Chicago and London: Chicago University Press.

Laidler, D (1999), 'The quantity of money and monetary policy,' *Bank of Canada Working Paper*, 99-105.

Mishkin, F (1986), *The economics of money, banking, and financial markets*, Little, Brown and Company, Boston.