The Reserve Bank, private sector banks and the creation of money and credit

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This article provides an overview of the functions of money, and how money and credit are created in the economy. The roles of the Reserve Bank and private sector banks are illustrated, and we explain the link between money and monetary policy.

1   Introduction

Money and credit, the products of the financial system, are important parts of our economy. The financial system enables 'real' activity – that is, the processes of production and trade of goods and services – to take place smoothly. Financial activity is thus part and parcel of economic growth and improvement in overall living standards.[1]

Money itself is not a modern innovation. Records of money date back 5,000 years to the Babylonians, who distinguished legally between 'exchangeable goods' and 'non-exchangeable goods'. Exchangeable goods included precious metals as well as certain commonly used goods such as oil and wine. It is likely that these exchangeable goods were used as means of exchange. The origins of money probably go back even further than this – beyond written history, with the use of cattle around 10,000 years ago.[2]

Over time, money has taken different forms. It has ranged from objects of inherent value, such as precious metals (commodity money), to tokens backed by reserves of a defined object of inherent value such as gold (for which the tokens may be redeemed), to the 'fiat' money in the form of the notes and coins in circulation today.

Unlike commodity money, fiat money has no intrinsic value. Neither is it backed by something else of value. Fiat money is established as money by government or official order or decree. Its effective use as money derives from its acceptability as payment for goods or services. Items other than fiat money can also be used in practice as money if both parties agree to a different sort of payment beforehand. Recognising this economic function of money, we consider money today as generally comprising both physical fiat money in the form of notes and coins, and electronic records of claims on financial institutions (such as banks) that are transferable to others and that are usually accepted as payment for goods and services.

Money and credit are so fundamental to our economy that we do not generally consider how money is created. This article looks at money creation in more depth. Section 2 discusses the concept of money, Section 3 describes money and credit creation in the banking system, Section 4 looks at the pricing of money in the banking system and its role in the implementation of monetary policy, and Section 5 concludes.

2   What is money?

Money is commonly described as a medium of exchange, a unit of account and a store of value. These three functions of money together are said to distinguish money from other financial assets such as shares and bonds, and goods with an 'investment' function such as art or real estate.

The *medium of exchange* function derives from the fact that money is the item that a buyer gives a seller in exchange for a good or service, with the seller typically using that money to make other purchases. The use of money in this manner overcomes the inefficiencies of the barter system, where two individuals with exactly corresponding needs have to come together to transact. Defining *liquidity* as the ease with which an asset can be converted into the economy's medium of exchange, money is the most liquid asset in the economy.

As a *unit of account*, money is used to measure the exchange value of a commodity or product. It is the yardstick that people use to price items and record debts.

Money has a *store of value* function because, unlike physical assets such as machinery that depreciate over time due to wear and tear, the face value of physical money does not change. Of course, inflation reduces the 'real' (or exchange) value of this form of money over time.

Once money is held in the banking system, interest-bearing accounts may be used to impart a better 'store of value' function to money. Take, for example, an amount of money that is invested with a bank for a period of time. If the interest earned on that sum is comparable to the rate of inflation in the economy over that period, then the purchasing power of that quantity is the same at the start and completion of the period. The real value of this money is thus unchanged.

3 The banking and payment system, and how money and credit are created

In a modern economy, money can be created either by the central bank (the Reserve Bank, in New Zealand's case) or by private sector institutions – in practice, mostly registered banks.[3] Section 25 of the Reserve Bank of New Zealand Act 1989 gives the Reserve Bank the monopoly right to issue physical money (notes and coins), which enters public circulation through the private sector institutions to which it is issued.

A private sector institution can also create money by issuing claims on itself (ie, by accepting deposits) that may be transferred between, and are generally accepted by, members of the public as a means of payment. For that matter, any institution that can maintain the public's confidence that its liabilities will be generally accepted as means of payment, can create money. Such an institution will, in practice, also be in the business of creating credit,

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[3] Besides the registered banks in New Zealand, certain institutions such as building societies, credit unions and finance companies also create money in the sense discussed in this article. There is no legal restriction on the type of institution that may create money in New Zealand.

which implies the issue of a greater value of claims on the institution than the value of Reserve-Bank-issued money the institution itself holds. In practice, by far the largest share of money – 80 percent or more, depending on the measure (discussed below) – is created by private sector institutions. For simplicity, in what follows, we use "bank" to refer to any institution that creates money or credit.

We illustrate this process of money and credit creation below, by tracing through example transactions in a hypothetical banking system.

A simple economy

Let us first consider an economy without banks. The only money available would be notes and coins issued directly to the public by the central bank (*currency*). In this economy, currency is the only object that can be used easily as a medium of exchange and a store of value.

Consider now, the inclusion of one bank, Bank A, into the economy. Individuals holding currency are faced with three options. They could:

- use up all of their currency in exchange transactions;

- save some of the currency and 'keep it under the mattress'; or

- save some of the currency and deposit it at the bank, on the expectation that the bank will repay them the currency when they want it.

If, at a point in time, two individuals, Customers X and Y, each deposit $500 into Bank A, the balance sheet of the bank will be as follows:

Figure 1
Balance sheet of Bank A before it creates money and credit

Assets		Liabilities	
Cash at hand – fiat ('outside') money	1,000	Customer X deposit	500
		Customer Y deposit	500
Total assets	1,000	Total liabilities	1,000

In this case, Bank A has enough cash, at all times, to meet all possible withdrawals. Its assets are all in the form of fiat money issued by the central bank. This is labelled 'outside' money in the balance sheet, reflecting that this form of money is a liability of the central bank created 'outside' the economy.

If Bank A's customers make payments to each other with cheques or via EFTPOS and internet transfers, there will be a change in the balances in their accounts at Bank A, but the total amount of deposits at Bank A will remain unchanged. In this case, the bank would not need to retain the cash deposited by these customers. However, typically, a small amount of payments will be made by cash, in which case individuals will withdraw cash from the bank against their deposits to make the payments. If Customer X makes a withdrawal to pay Customer Y, it is likely that Customer Y will re-deposit most or all of the cash back with Bank A – out of concern about theft, for example, or for convenience.

If, say, 10 percent of deposits are typically withdrawn for cash payments weekly, and this amount is re-deposited with the bank, then Bank A only needs to hold $100 in cash at hand to support likely withdrawals on its total deposits of $1,000. (In practice, Bank A will not be certain about the 10 percent ratio, and there is a risk that there may be greater withdrawals. Bank A is therefore likely to hold a safety margin of cash at hand, in case withdrawals turn out to be greater than expected, or re-deposits of cash turn out to be less than expected.)

Bank A can thus lend out $900 to its customers. They can then use this $900 as payment for goods and services. The $900 will likely be re-deposited. This is the first step in the process of money and credit creation by Bank A. So far, it has created $900 of money, and it has created credit to the same value.

This credit might be used by Bank A's customers to purchase capital assets, and thus contribute to growth in this economy. In producing credit, the bank performs a useful function in dedicating resources to determine potential borrowers' creditworthiness (a process that is costly), which the bank can do more efficiently than its customers could each do individually if they were to lend to each other directly.

Turning back to the money side, in our scenario, only $90 of the $900 in new money is likely to be withdrawn as cash, with other payments being possible through electronic transfers of account balances. Bank A thus has a further $810 to lend out. As this process continues, the ultimate outcome is that the initial $1,000 in deposits can be used to create new deposits (money) and credit (loans) to the value of $9,000. This new money is generally termed 'inside' money to reflect that it has been generated by the private bank 'inside' this economy. Bank A's balance sheet has grown from $1,000 to $10,000. This is shown below:

Table 1
The process through which money and credit is created

	Customer deposits	10% reserved as cash at hand	Loans made
Step 1	1,000	100	900
Step 2	900	90	810
Step 3	810	81	729
Step 4	729	72.9	656.1
Step 5	656.1	.	.
etc.	.	.	.
Total	10,000	1,000	9,000

Bank A's balance sheet would then be as follows:

Figure 2
Balance sheet of Bank A after the creation of money and credit

| Assets		Liabilities	
Cash at hand – fiat ('outside') money	1,000	Customer deposits – includes 'inside' money	10,000
Loans to customers	9,000		
Total assets	10,000	Total liabilities	10,000

Since the depositors of the $10,000 can spend or transfer the amount, as they could with the original $1,000 issued by the central bank, Bank A has created money worth $9,000 and added this amount to the supply of money in the economy. It has also created credit to this value. Because the value of inside money created is necessarily equal to the value of credit created, the net worth of the private sector remains unchanged.

Adding more banks

When more banks are added to this model economy, it is no longer the case that cash payments will necessarily be re-deposited with the same bank, though the logic of the money and credit creation process in the banking system as a whole is the same. However, in this setting, with more than one bank, there is a need for an interbank payment system to manage the payments that need to be made across banks on account of their customers' payments activities.[4] The interbank payment system in New Zealand (which is a typical case) is built around deposit accounts the banks have at the Reserve Bank. This system can be illustrated as below:

Consider Customer X and Customer Y again, who have deposit accounts with Bank A. When Customer X pays Customer Y electronically, Customer X's deposit account is debited and Customer Y's account credited accordingly. Bank A's deposit with the Reserve Bank remains unchanged. Now consider a Customer Z who banks with Bank B. When Customer X or Y pays Customer Z electronically or using a cheque drawn on Bank A, an interbank transaction needs to take place. In this instance, besides the individual accounts of the customers at Banks A and B being affected, the deposit account of Bank A at the Reserve Bank is debited and that of Bank B is credited accordingly.

Figure 3
The banking system

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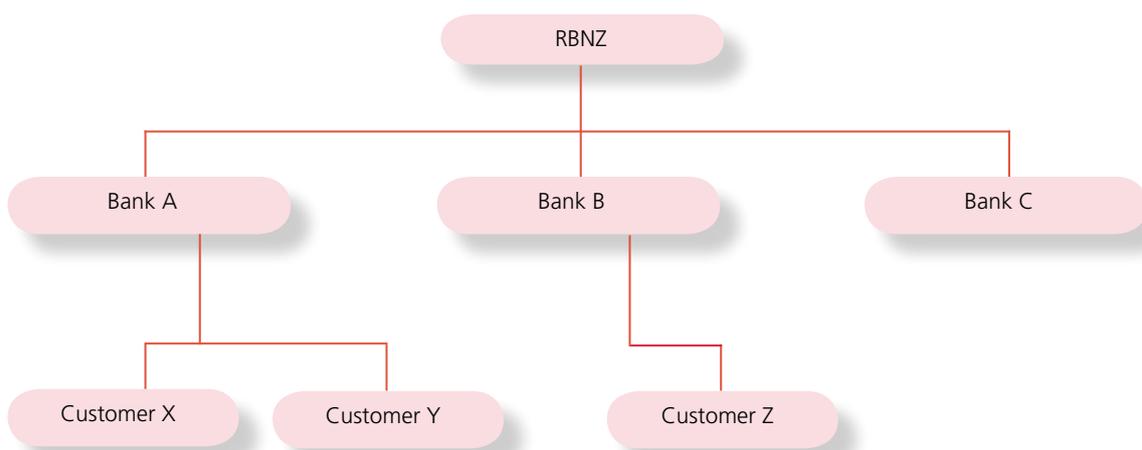
[4] A detailed description of the payment system in New Zealand can be obtained from Bollard (2005).

4 The money supply, inflation and monetary policy

Measuring the money supply

While money can be issued by the central bank or created by private institutions, as illustrated above, in the vast majority of circumstances there is no practical difference between these two forms of money in terms of the medium of exchange function. In measuring money, the Reserve Bank constructs money aggregates based on the varying levels of liquidity of the various types of money, rather than on who has issued or created the money (see Collins *et al.* (2001) for more detail on the Reserve Bank's approach to measuring money). These aggregates are listed below.

- The stock of currency not in bank tills is the narrowest measure and refers to the notes and coins issued by the Reserve Bank that are held by the public. This measure averaged $3 billion in 2007.

- M1, the next measure, includes notes and coins held by the public plus balances in accounts on which cheques can be written. M1 averaged $23 billion in 2007.

- M2 is a broader measure still and encompasses M1 plus all other business or personal deposits that are available 'on demand'.[5] All EFTPOS accessible (non-cheque) funding is included in this aggregate. M2 averaged $70 billion in 2007.

- M3 is the broadest measure of money. It represents all New Zealand dollar funding of most registered banks and three other financial institutions.[6] This aggregate consists of M2 plus term funding of those institutions. M3 averaged $192 billion in 2007.[7]

Diagrammatically, the different measures of money can be represented as the concentric circles shown below, decreasing in terms of liquidity as they broaden out.

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[5] More formally, these deposits refer to call deposits, which are accounts that comprise overnight money and funding that can be accessed without break penalties.

[6] A complete list of institutions in M3 can be obtained from the Reserve Bank website.

[7] M3R is the 'resident' M3 aggregate and represents New Zealand dollar funding from New Zealand residents only. This aggregate is the same as M3, less funding sourced from non-residents. M3R averaged 159 billion in 2007.

Figure 4
Monetary aggregates
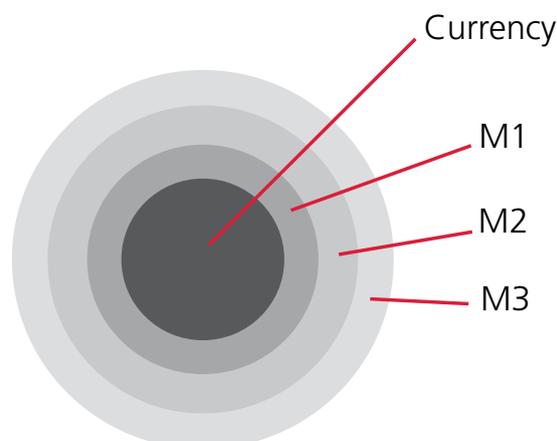
The implementation of monetary policy

As shown above, the Reserve Bank's operations in supplying 'outside' money are central to the banking system's money creation processes. These operations are also central to the Reserve Bank's implementation of monetary policy in pursuit of its primary function of maintaining price stability, as required by section 8 of the Reserve Bank of New Zealand Act 1989.

Since 1999, the Reserve Bank has performed this function by adjusting the Official Cash Rate (OCR) to target inflation.[8] The OCR tightly and directly controls the price of outside money as supplied to the banking system through the interbank payment system set out above.

At first, it may seem odd that the implementation of monetary policy is conducted through the price of money rather than the quantity of money. Indeed, the 'monetarists' of the late 1960s and 1970s applied the Quantity Theory of Money – in which the price level is determined by the balance between nominal money supply and the demand for real money balances (determined by the level of activity in the economy) – and concluded that the only way to control inflation would be to control or 'target' the money supply.

The historical experience of implementing monetary policy based on this approach was not favourable, because of rapid financial innovation. Central banks thus reverted to interest rate targeting. Modern monetary policy now assesses the

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[8] Refer to Reserve Bank of New Zealand (1999) for the rationale for moving to this system of monetary policy implementation.

expected paths of inflation and output as a consequence of the control of interest rates by the central bank. There will be a resulting path for the money supply and that path may provide useful information on the state of the economy, but policy deliberation no longer focuses on trying to control the money supply. (For more discussion of the evolution of the use of money and credit measures in monetary policy over the past few decades, see the article by Bloor *et al.* (2008), "The use of money and credit measures in contemporary monetary policy" in this issue of the *Bulletin*.)

Under the current OCR operating arrangements, the deposits in the accounts that the banks hold with the Reserve Bank – represented as the pink boxes in Figure 3 – earn the OCR as interest.[9] If Bank A or B does not have sufficient money in its Reserve Bank account to meet its interbank payment obligations, it can borrow either from other banks or from the Reserve Bank. If the bank in deficit borrows from other banks (for example Bank C), it will generally be at a rate close to the OCR. This is because the Reserve Bank itself undertakes to lend (against certain approved collateral) an unlimited quantity of money to registered banks overnight at a rate of 50 basis points higher than the OCR.[10] The effect of the undertaking is thus that the Reserve Bank sets the price of money prevailing in the banking system, and enough money is provided to the system to ensure smooth settlement of interbank transactions to support customer payments.[11] Currently, this amount is around $7 billion.

As noted above, the Reserve Bank moves the OCR to maintain price stability, raising the OCR when economic developments are tending to push inflation up, and lowering it when

inflation pressures subside or when inflation is tending to fall. Changes in the OCR modulate inflation pressure by influencing the interest rates banks charge and offer, and thus influence demand and supply in the economy. These channels are referred to as the transmission mechanism of monetary policy.[12]

For example, the Reserve Bank would tend to increase the OCR in response to an increase in inflation pressure. The rise in the OCR would tend to flow through to higher bank interest rates, which would offset the pressure by shifting preferences from consumption to saving, because the cost of borrowing has increased, and the return from savings is also higher. This translates into a lower demand for consumption and investment goods, easing the inflation pressure in the economy. When the OCR is raised, it also results in an appreciation of the New Zealand dollar because the demand for New Zealand interest-earning investments increases. As the demand for the New Zealand dollar increases, the value of the dollar appreciates. The higher dollar dampens exports and increases the demand for the relatively cheaper imports, also lowering demand and thus the inflation pressures.

As set out above, the Reserve Bank supplies money 'on-demand' to the banking system at the OCR. Banks may then create money and credit at a volume depending on their customers' own demand for money and credit. In practice, the public's demand for money fluctuates significantly, and the volatility of 'excess' money growth (that is, the rate of growth of the ratio of the money stock to real GDP) is considerably larger than that of inflation (see figure 5).

Figure 5

Excess money growth and inflation
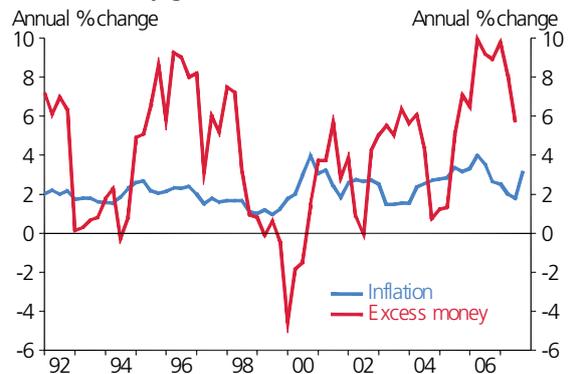
Sources: Statistics NZ, RBNZ.

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9   More information can be obtained from Nield (2006).
10 Prior to changes to the Reserve Bank's liquidity management regime in July 2006, the Reserve Bank's undertaking to lend was at a rate of 25 basis points higher than the OCR (rather than 50 basis points higher), but the interest rate paid on accounts banks held with the Reserve Bank was 25 basis points lower than the OCR, rather than exactly equal to the OCR as now. Nield (2006) discusses the reasons for these changes in detail. The changes had no consequence for monetary policy, but improved the functioning of the interbank payment system.
11 If one bank, Bank C, tries to charge another bank, Bank B, a rate higher than that charged by the Reserve Bank, any profit earned by Bank C will be 'arbitraged' away by other banks offering to supply Bank B at a lower cost of borrowing than that offered by Bank C. This supply would be funded by a loan from the Reserve Bank until the profit opportunity disappears.
12 See Drew and Sethi (2007) for a detailed explanation of this process.

5   Conclusion

In this article, we have explained the manner in which money is created by the Reserve Bank and by private sector institutions. While the Reserve Bank creates fiat money, in practice, a much larger share of money is created by registered banks and other private institutions. In the process of creating money, these private institutions also create credit, which by enabling the funding of investment, contributes to the economy's ability to grow. Payments are settled between these money-creating institutions via the interbank payment system provided by the Reserve Bank, using deposit accounts that the institutions hold with the Reserve Bank. The Reserve Bank's operations in the payment system are the means by which the Reserve Bank sets the price of money – the OCR – in its pursuit of price stability.

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