

Quantitative Easing and the money supply process- will it lead to inflation this time round?

Brian Kantor

Investec Wealth and Investment

April 6th 2020

Central Banks around the world are launching a new phase of accelerated money creation now known as Quantitative Easing or QE. They are doing so in response to the economic contraction caused by the Corona Virus and the lock downs of economic activity intended to limit the spread of the virus. The scale of this QE and its consequences for economic activity asset prices and inflation are still to be revealed.

QE was first initiated in response to the Global Financial Crisis of 2008-2009 that so threatened the real economy. This time the lock-down of economies and the consequent loss of output and incomes and flows of revenues threatens financial and economic stability more broadly. This crisis – health and economic - has led to more QE by many central banks including this time round, the SA Reserve Bank. The SA Reserve Bank did not have to do QE in 2008-9 – SA was not then threatened by a banking crisis. It is much threatened by the lock-down

Providing central bank money (cash) for the banks and other key providers of credit will support their balance sheets and help keep them and their customers solvent when the equivalent of 10% or more

of annual GDP is being sacrificed for better public health. The injection of cash into the banks will hopefully sustain their provision of lending and money transmission services more or less normally. Additional cash supplied to the banks on inexpensive terms will help them overcome the losses, the defaults, associated with any sudden inability of borrowers to service their debts. For want of the revenues that accrue in normal circumstances, many more businesses would have to close down perhaps permanently without assistance from their bankers and other creditors.

The extra money created by central banks will also be used to fund a surge in government spending. It will be used to fund spending or tax relief designed to supplement the incomes of individuals and businesses permanently lost in the shutdowns. Government spending on medical services can be financed this way. Funding spending and tax relief that will significantly widen the fiscal deficit. That is the difference between ongoing government expenditure, and debt redemptions and ongoing revenues, that will be declining with the sharp slow-down in economic activity accompanying the lock-downs.

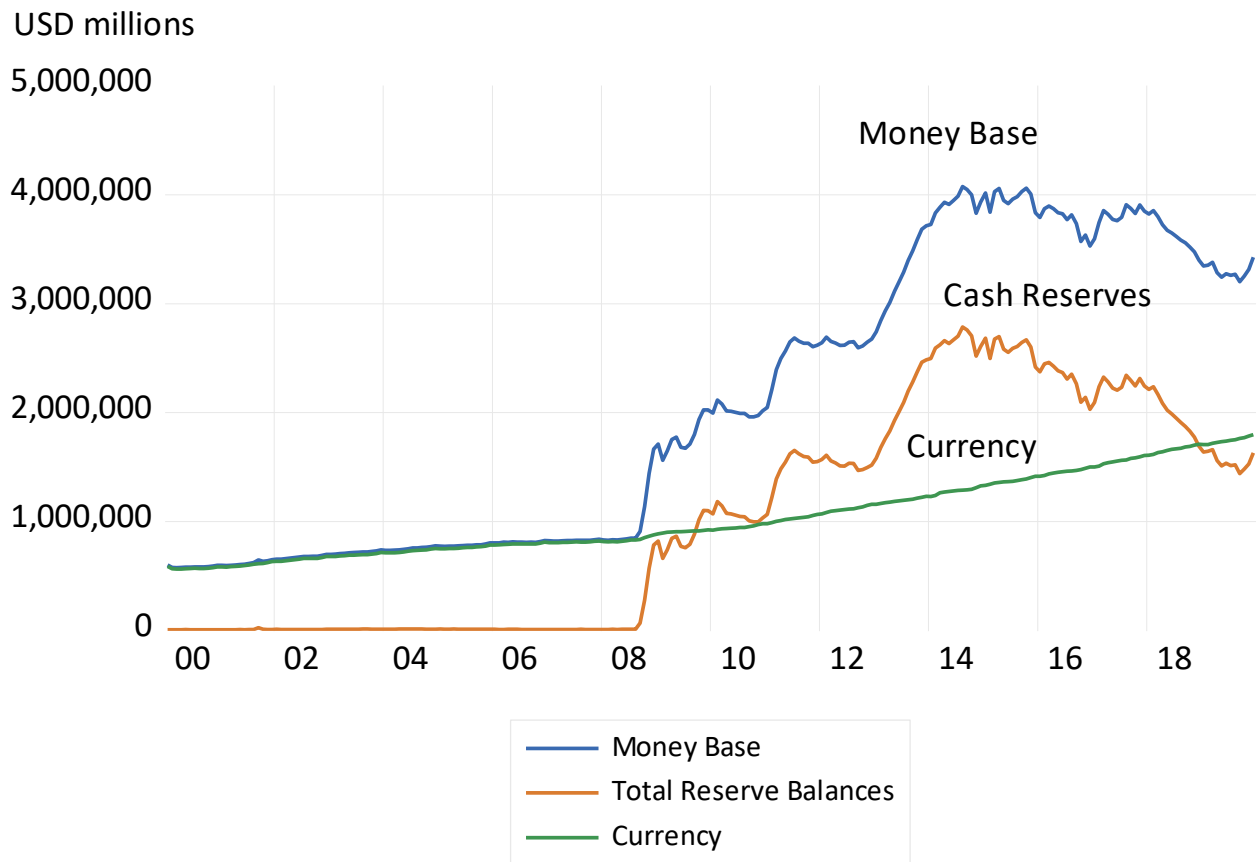
We will describe in some detail the process of money creation by central banks and explain the relationship between the supply of central bank money and the supply of deposits and credit supplied by the private banking system. We focus on the QE conducted by the US Federal Reserve Banks. We examine the mechanics of money supply creation by reference to the SA Reserve Bank.

The total supply of US central bank money is sometimes described as M0 or the Money Base or as *High Powered Money* for reasons to be explained below. Central Bank money or cash takes the form of currency and cash reserves held by private deposit taking banks with

the central bank. The increase in the money base in the US (January 2000 to February 2020) is shown below. Note how rapidly the money base grew after 2008, and has been matched by an equally extraordinary increase in the private bank's demand for cash reserves (that is for deposits at the Fed)

Note also how the money base in the US peaked in 2014 and then declined rapidly in 2018 – as QE was reversed. In late 2019 it rose sharply again to support the banking system that was found unexpectedly short of cash that put unwanted pressure on inter-bank lending rates. The most recent Corona virus-inspired surge in the money base can also be seen. The supply of currency by contrast has increased at a very steady rate- in response to the demands for dollar bills- in and outside of the US.

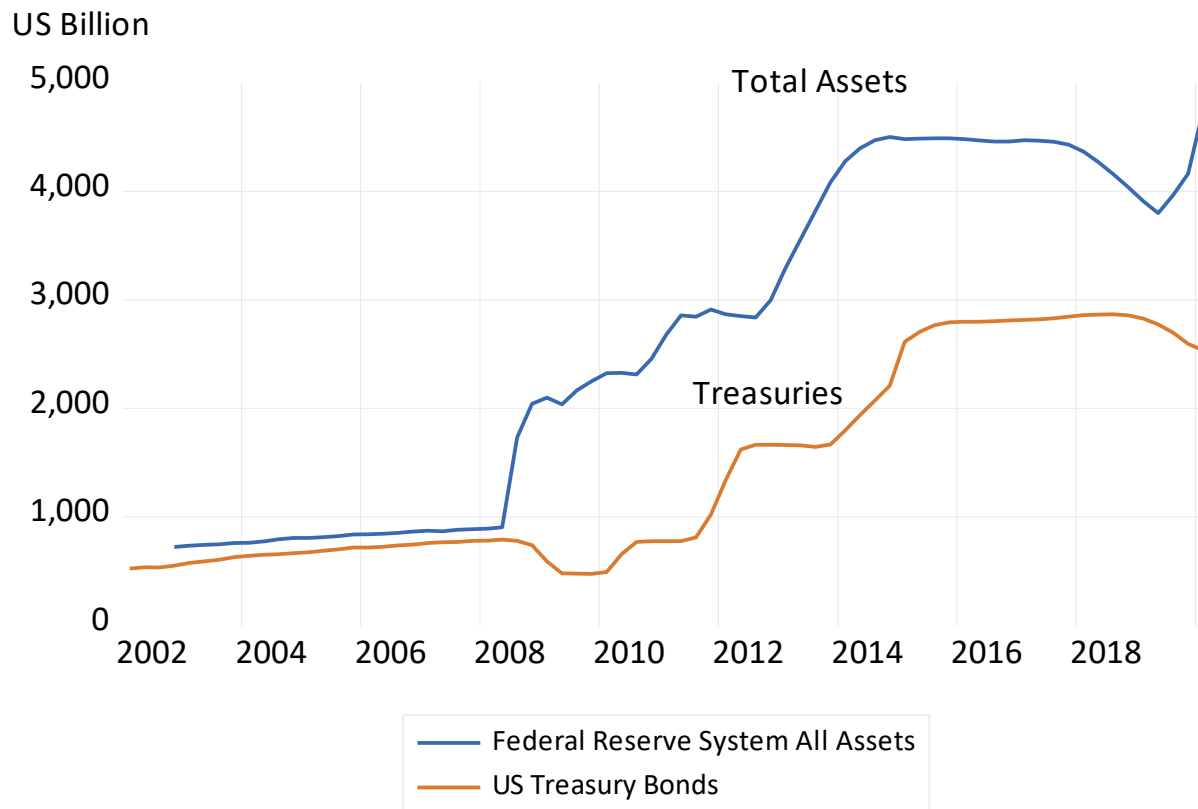
Fig 1; The Liabilities of the US Federal Reserve System that make up the Money Base



Source; Federal Reserve Bank of St.Louis. Investec Wealth and Investment

We show the asset side of the US Fed Balance sheet in the chart below. (figure 2) As may be seen most of the growth in assets – and liabilities – was the result of the Fed purchase of US Treasury Bonds in the capital market. The other assets of the Fed include loans made to banks and mortgage backed securities issued by government agencies.

Fig.2; Total Assets of the Federal Reserve Bank System and Holdings of Treasury Bills and Bonds

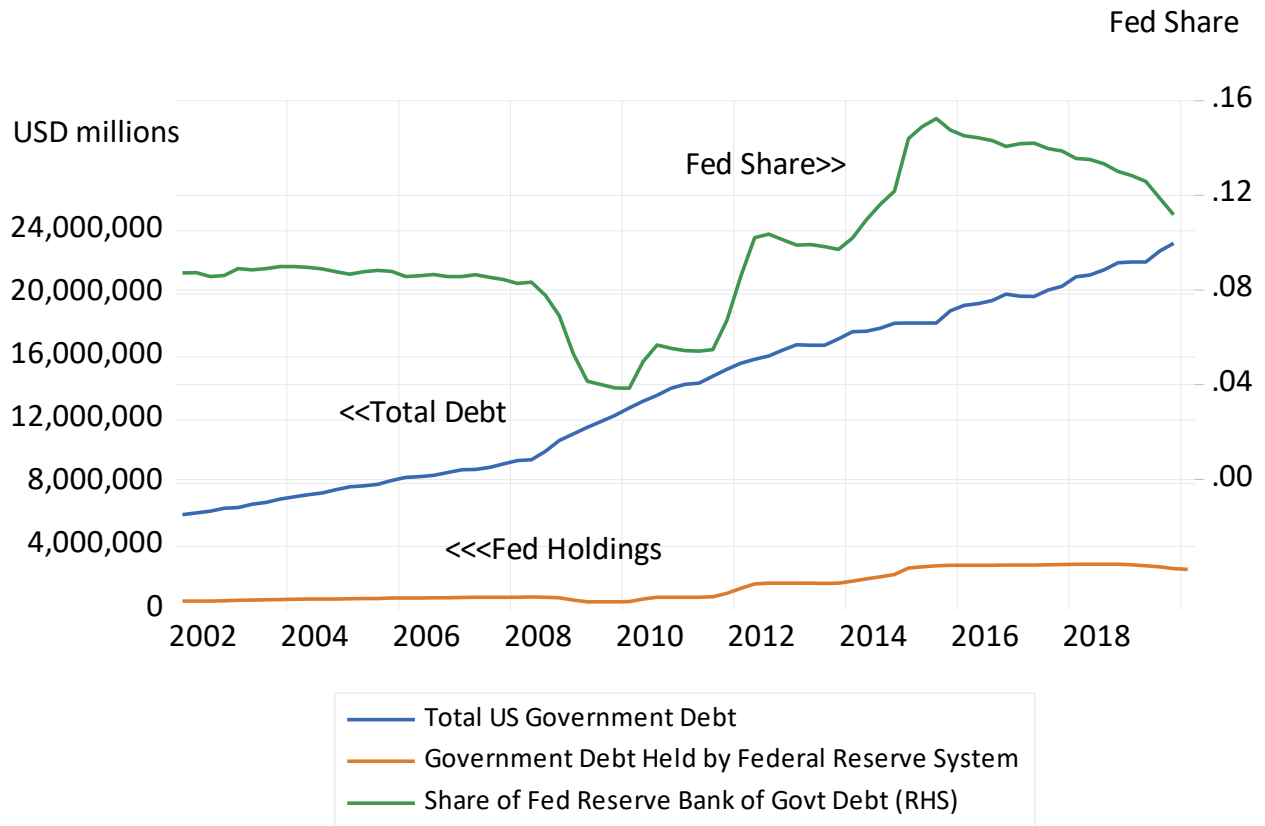


Source; Federal Reserve Bank of St.Louis. Investec Wealth and Investment

These Fed holdings of securities issued by the US Treasury have gained an important share of all the debt incurred by the Federal Government

– currently the Fed share is around 12% of all US government debt – as we show in figure 3 below.

Fig.3; Federal Debt and US Government Debt held by Federal Reserve System



Source; Federal Reserve Bank of St.Louis. Investec Wealth and Investment

Increased Treasury Bond holdings of this magnitude have surely helped to reduce the interest rates paid on US Treasury Bonds. Since the Federal Reserve Bank of the US, while it keeps a separate set of accounts and balance sheet, is a wholly owned agency of the Federal

Government. If we consolidated their balance sheets and set off the Reserve Bank's holdings of Treasuries against the total Fed debt, we would reveal a reduction in outstanding Federal debt, replaced by the increased deposit liabilities of the Federal Reserve Banks. In other words cash – irredeemable non-interest bearing government debt - that is issued by the government or rather its central banks without interest – replacing interest bearing debt. Though, when the interest paid on government debt, short and long dated, is very low- close to zero- as it is now in the US - the distinction between debt and money is irrelevant from the perspective of the issuer.

When a central bank creates money to fund government spending this funding arrangement is an alternative to extra government borrowing in the capital market. When a central bank buys government bonds in the secondary rather than the primary market, it is opening room for investors to replenish their portfolios in the primary market. It has the same outcome as an investment in a new issue of debt –an increased demand for government debt issues.

Calling on the central bank for finance is an alternative to what may be described as genuine borrowing from willing lenders at market determined interest rates and repayment terms that are ordinarily used to fund any excess of government spending over government, mostly tax revenues. Such borrowing however might prove very expensive or even unobtainable in extreme circumstances such as the present. South Africa provides an example of such extreme pressure in its bond market. Creating money – by calling on the central bank for loans - might then be the only practical way to enable urgent government spending to go ahead.

As indicated this money- the zero-interest bearing debt of the government comes in the form of currency- notes and coin – issued by

the central bank that no creditor would or could refuse in exchange for goods or services. But more important in aggregate, it comes in the form of deposits, mostly by private banks, made with the central bank. Money, or if you prefer to call it cash, that can be drawn upon in exchange for goods and services that again no supplier or creditor would ever refuse. Because these deposit claims on the central bank can in turn always be freely exchanged for goods and service as money.

When the central bank buys assets in the market place or makes loans to governments or banks it creates money by crediting the sellers of securities or the recipients of a central bank loan with a Central Bank credit. It means an addition to their deposits with the central bank. They are then free to exchange the money received for other goods and services or for other assets. They may however prefer to retain the extra cash so received as such – using the extra cash to add to their cash holdings - as the US banks mostly did with extra cash received after their crisis of 2008-09.

Among the depositors with the central bank is the government itself. When the government directly raises a loan from the central bank (for example in the primary market, at the auction of newly issued government bonds and receives a credit in return, this is not regarded as an increase in the money base. However when the government disburses the funds so acquired to buy goods and services, including the labour services of government employees, and runs down its deposit account with the central bank, the deposits of other banks will rise automatically and the money base will expand accordingly.

The suppliers to the government will almost all bank with the private bank and add the cheques or electronic transfers received from the government to their deposit accounts with the banks, and the banks

will deposit these cheques or raise their credit digitally, to increase their deposits, their cash with the central bank

Central bank money, currency and cash reserves in the form of deposits with the central bank is described as the money base of the system or more evocatively as “high powered money”. This is because the bulk of the money held and used to pay for goods and services is supplied by the private banking system in the form of transaction balances (deposits) held with them and exchanged on the instruction of depositors. The advances banks make mostly stay with the banking system. They arrive as deposits with other banks or even as a deposit with a bank making the loan. The funds lent, borrowed and spent do not drain away – except when withdrawn as notes or deposited in a foreign banking account.

However the private banks will hold notes and coin in their tills or ATM’s to meet the demand for currency of their depositors – and they have to keep a cash reserve in the form of deposits at the central bank, to meet the demands of other banks for the settlement of customer accounts that might be outstanding to other banks at the close of any one banking day. It is this cash reserve that sets the theoretical limit to the sum of the loans in one form or another that the banks may make. It therefore sets the limits to the so -called money multiplier – the ratio of broadly defined money – known as M1 M2 or M3 made up of bank deposits of various kinds from transactions balances or longer term deposits- to the central bank money.

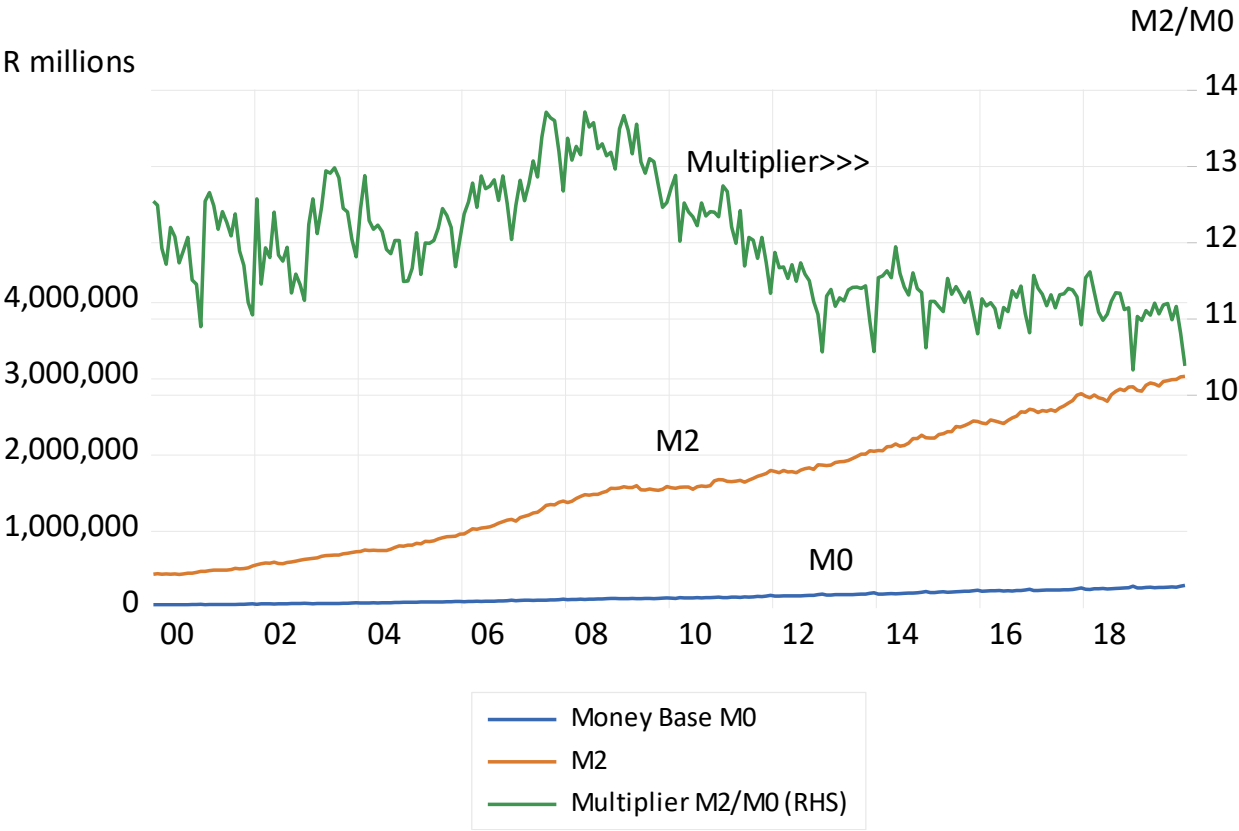
Banks are regulated to hold a minimum ratio of cash to their deposit liabilities. Banks in the US since the GFC have chosen to hold cash reserves vastly in excess of these minimal required reserves. Not so in South Africa. South African banks hold very little by way of excess cash reserves – cash reserves in excess of the regulated ratio- 2.5% of

deposit liabilities. Rather than holding excess reserves SA banks consistently borrow significant sums from the Reserve Bank to meet their demands for cash as we will demonstrate below.

The more cash that is held in reserve or has to be held in reserve as per regulation against the deposit or other liabilities of a bank the less the bank will be able to advance to borrowers of one sort or another.

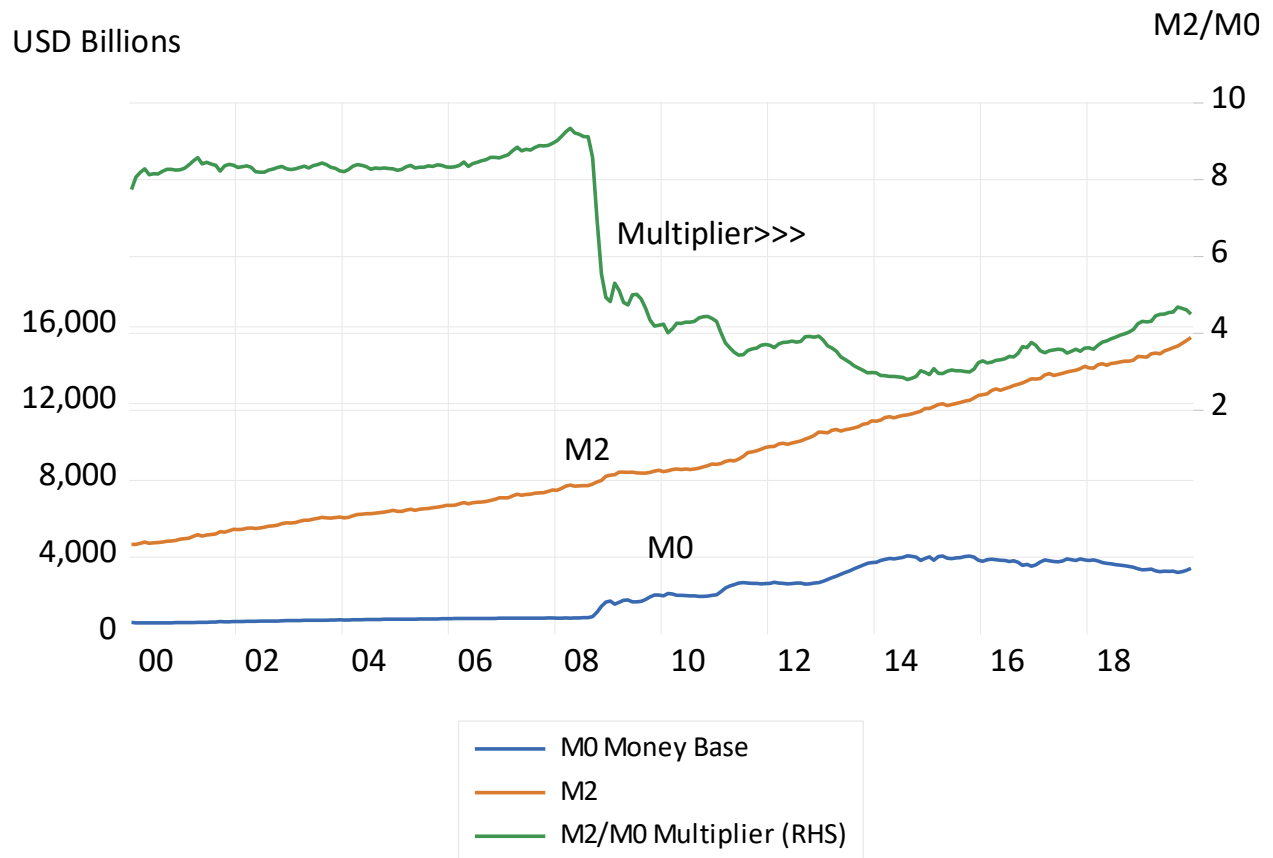
The amounts spent against any loan facility provided by a bank will mostly return to the banking system as deposits as mentioned earlier. Hence the supply of deposits in the system becomes a multiple of the cash reserves held by the banks – and so the supply of cash made available to the system. That ratio or multiplier as we show below was of the order of 14 times in SA M3/M0 or 8 times in the US M2/M0 before the GFC. It collapsed in the US to about 3 times as the demand of the banks to hold a much greater reserve of central bank money was exercised by the US banking system. It has increased recently to about four times the money base or M0. See figures 4 and 5 below.

Fig 4; South Africa Narrow and Broader definitions of the Money Supply and the money multiplier



Source; SA Reserve Bank, Investec Wealth and Investment

Fig.5; US Money Supply and the money multiplier



Source; Federal Reserve Bank of St.Louis. Investec Wealth and Investment

It is important to note that while the supply of Fed money in the US increased dramatically after the GFC – so as rapidly did the demand to hold extra cash by the banks increase. The ratio of cash reserves of the banks to their deposit liabilities therefore rose dramatically as a

response to presumably the newly enhanced danger of a banking and financial crisis- that manifests itself as a general shortage of cash. As we show in the figure above.

For which QE was a solution, though not something highly leveraged financial institutions, especially banks would like to have to rely upon. They have come to prefer to hold large amounts of cash – far larger as a proportion of their deposit liabilities than was the case before the GFC. It will be of great interest to see how banks in the US and SA respond to the QE undertaken after the Corona crisis. The mechanics of the money supply process, including the factors determining the scale of the money multiplier, are further developed below.

It should be fully understood that while bank deposits can be measured as a multiple of the cash supplied to the system this does not mean that the banking system can “create deposits” in some magical, costless way. Supplying deposits to the system and maintaining the payments system to which a deposit account gives access, is a costly exercise. It takes computer systems and ATM machines and premises and people to manage the system and equity capital. And loans may not always be repaid. Banks may go broke if their bad loans exceed the value of their equity which may only be equivalent to 10-15 per cent of their loans and advances. And they may also go under if they cannot meet a run on the bank- a demand for cash in exchange for their deposits - which is their contractual obligation.

The limits to the size of a banking system- the aggregate value of its assets and liabilities -will be determined in any full analysis of the determinants of its size, by its profitability. Profitable banks grow their assets and their deposit liabilities - unprofitable banks shrink away. The profitability of a bank is enhanced by leverage – minimising as far as responsible its cash reserves and equity capital. Banks are typically

highly leveraged businesses. But risk of failure in all enterprises comes with leverage and prudence may limit lending activity, may have to mean larger cash and capital reserves, fewer loans and so reduced profitability and so a smaller money multiplier -as has been the case in the US since the GFC. The habits of the customers of the banks, how much they prefer to use notes to make payments rather than accept bank deposits as payment, will also influence the cash reserve ratios of the banks and so the volume of their lending. The money habits of the community – a preference for money in the bank rather than in the pockets or purses or in offshore banks – may change only gradually over time- so limiting the growth over time in the banking system. The relative importance of a banking system might be measured as the ratio of bank assets and liabilities to GDP in money of the day prices.

An economy depends on a thriving profitable banking system – able to support growing businesses with convenient funding. Zombie banks - undercapitalised banks -that survive only on government and central bank life support - are not helpful for economic growth. Furthermore it should be appreciated that every deposit made with a private bank represents a real saving - of consumption spending – however temporary. Money in the bank is as much a saving- a reduction in potential spending out of income or wealth – as a contribution to a pension fund. It is a more liquid form of saving, they are savings more easily cashed in for goods, services or other assets at a certain money value. Cash is an important component of any wealth portfolio and part of the working capital of any business.

However what is true of the deposits of a private bank that act as money in competition with the notes issued by the central bank – that they are costly to produce- is not true of the cash issued by a central bank. Such cash is almost costless to produce and can be supplied in

unlimited quantities. It is convertible only into the same government sanctioned cash.

This was not always true. Under the gold standard central bank money could be converted into gold at a fixed rate of exchange. And the prospect of such conversion limited the amount of central bank money that would be issued. For fear of running out of gold in the same way that the fear of running out of cash limits the loans made by any commercial bank.

The value of a currency is based on trust, a pure fiduciary money that costs little cost to supply, but has value in purchasing power terms to the government issuing the money. Why then should any government restrain the amount of money it creates? The limits to issuing money, is that issuing too much of it - more than would be willingly held as a reserve of purchasing power – is that the money created would consistently lose its value in exchange. That is cause inflation – defined as a continuous increase in the price level - and a persistent decline in the foreign exchange value of the currency and its purchasing power. This is usually not a politically popular outcome.

Inflation and currency depreciation would follow should the supply of central bank money consistently exceeded the demand of the public and the banks to hold that central bank money as a reserve. Thus it is not the supply of central bank money that will cause inflation. It is the excess supply of money over the demand to hold that money that will do so, as history has so often recorded.

If the banking system regards the supply of the cash it receives from the central bank as exceeding the demand to hold that extra cash, it will increase its supply of credit- it will turn cash into bank loans and lending of all kinds- including to the government. The supply of bank credit and bank deposits will then rise by a multiple of the extra supply of cash –

high powered money so to speak- because the supply of bank deposits and central bank money (M2) will be a multiple of the money base. And the extra bank credit will clearly be associated with an increased volume of spending of the kind that can drive up prices in general.

QE after 2008—09 representing an extraordinary increase in the global supply of central bank money did not cause inflation because much of the extra cash issued was willingly held by the banks. Had the banks used the extra cash to make additional loans the supply of deposits (money broadly defined) and the supply of bank credit would have grown proportionately – say at the eight times multiple normal before the GFC. And spending would have grown much faster than it did with the aid of much more bank credit and prices would have risen much faster than they did. Thus it is not the supply of money that automatically leads to more spending and higher prices. It is the excess supply of money- central bank money- over the demand to hold that money that causes bank credit to increase and prices to rise.

Time will tell what use is made of the extra cash created to fight Corona Virus. Will it be held mostly as additional cash reserves by the banks? Or will it stimulate a burst of extra bank lending and a multiple creation of deposits? That is prove more inflationary than QE was last time round- post the GFC? The reactions to QE in SA – the scale of it and the trends in money supply and bank credit will be of particular interest. Time as always will tell.

It is worth noting that commercial banks in the US have very recently sharply increased their supplies of credit to the private sector. This suggests that the extra cash supplied to them is being put to work as loans- and not only being held as additional cash reserves. This will be helpful to the real economy and to the profitability of the banking system. (See figures below)

Fig. 6; Weekly data to April 1st 2020

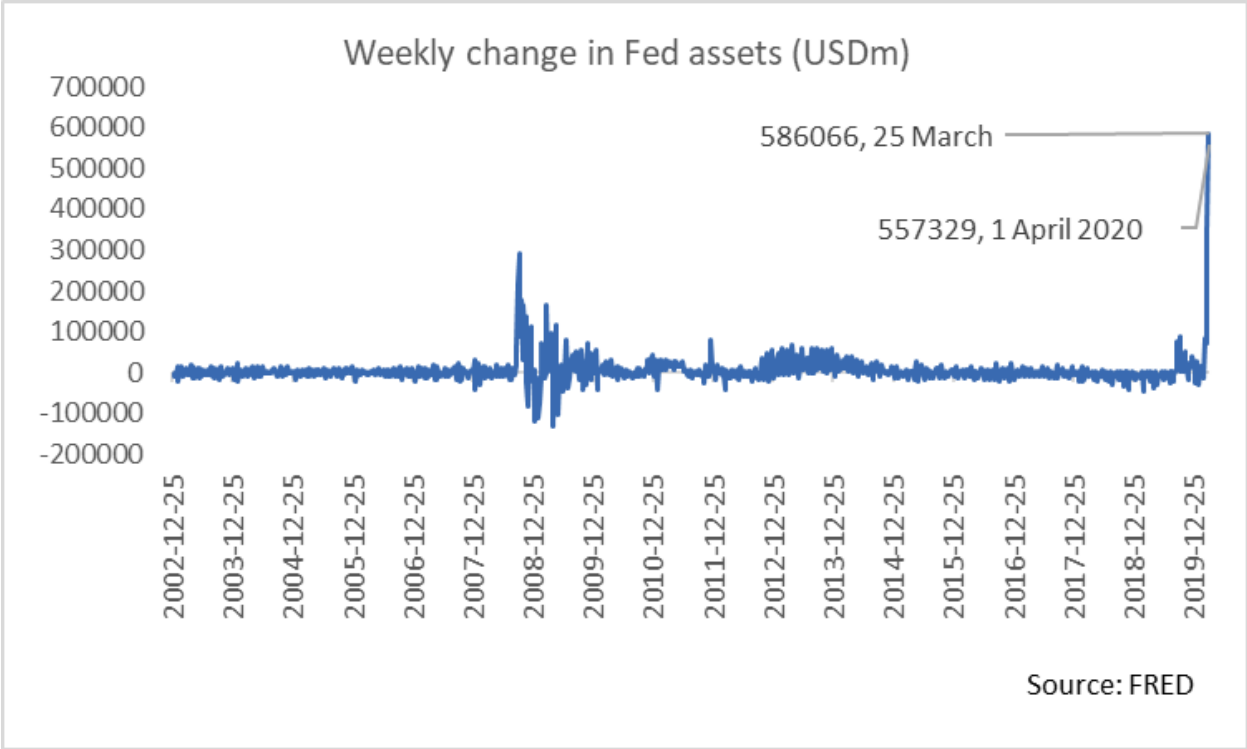


Fig 7; Weekly Data to March 25th 2020

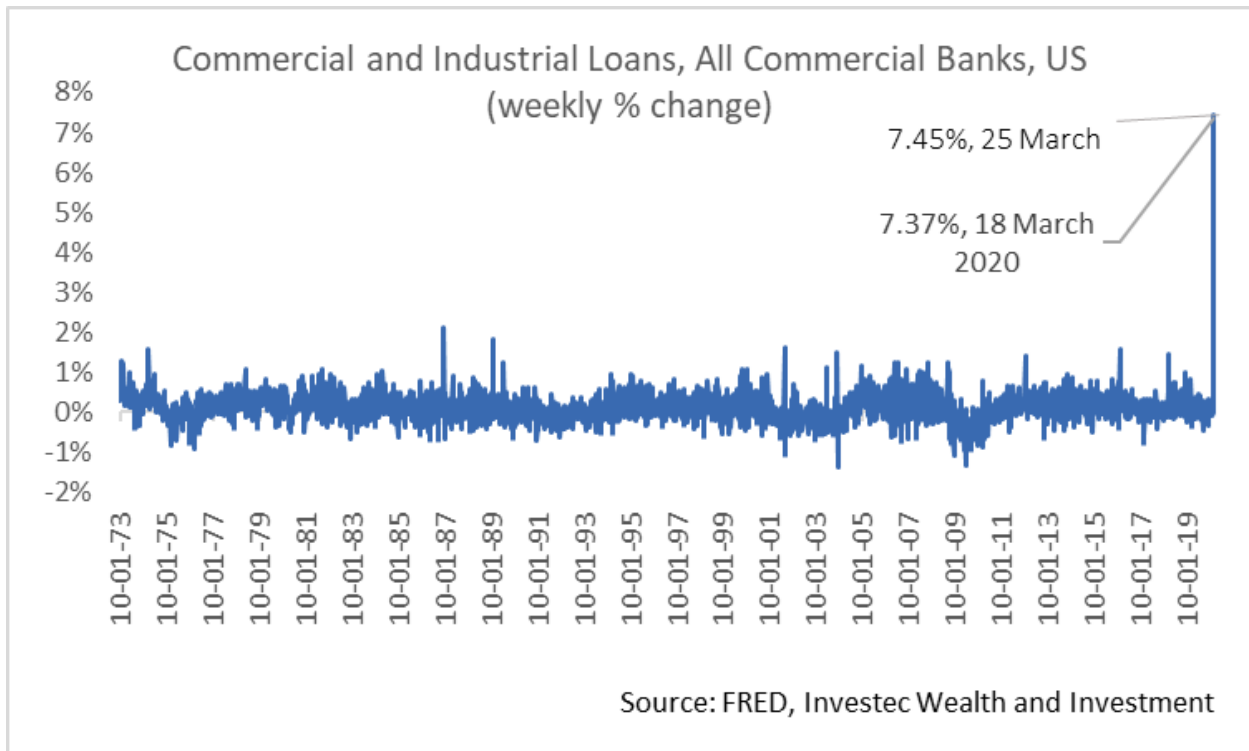
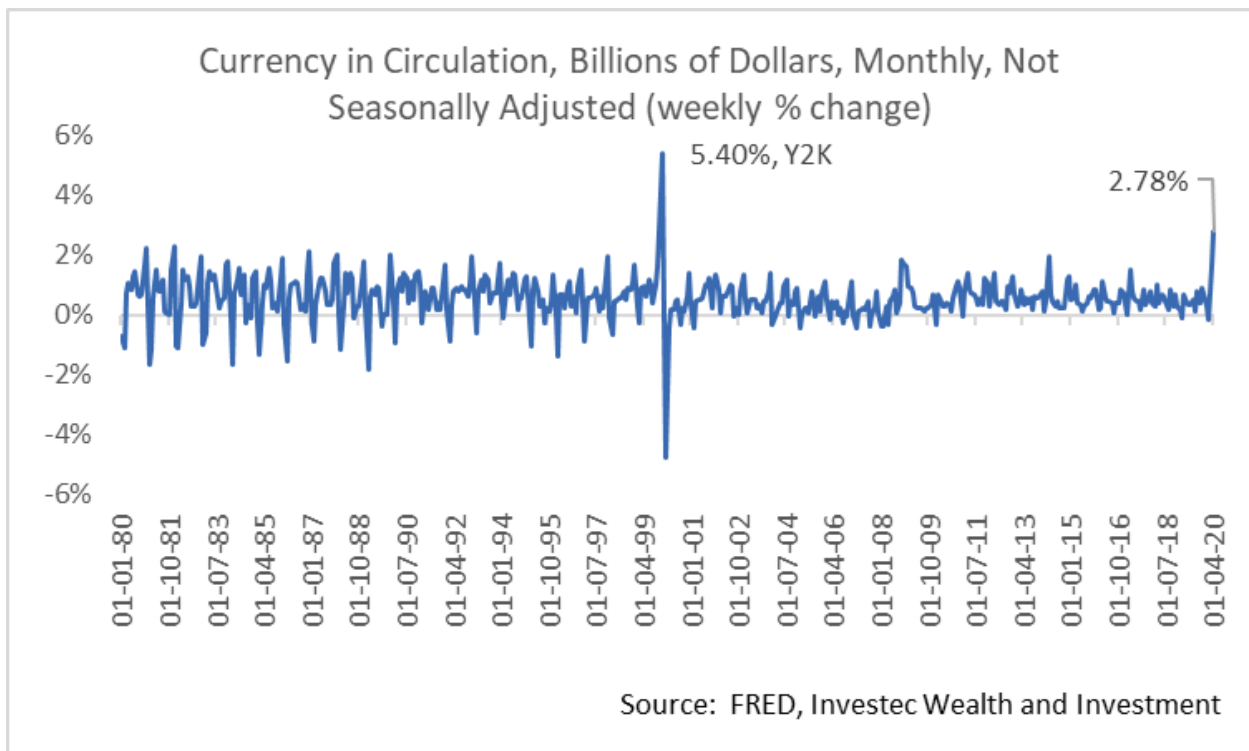


Fig.8 Weekly Data to April 1st.



Concluding remarks

The future of the global economy and the SA economy has seldom been more difficult to predict. The reactions of governments, the central banks and their banking constituencies have all to unfold before our eyes in unique circumstances. They will all deserve and get the closest possible attention.

The longer -term money supply trends and the ability of economies to recover lost output and incomes will together determine how inflation rates and exchange rates evolve over time. The rate at which central bank money is converted into bank and other credit will always be important for the level of demand everywhere. It is hoped that this analysis will help focus attention on some of the most important variables that will influence the demand side of any economy.

Money Mechanics. A case study based on the SA Reserve Bank Balance Sheet – with commentary

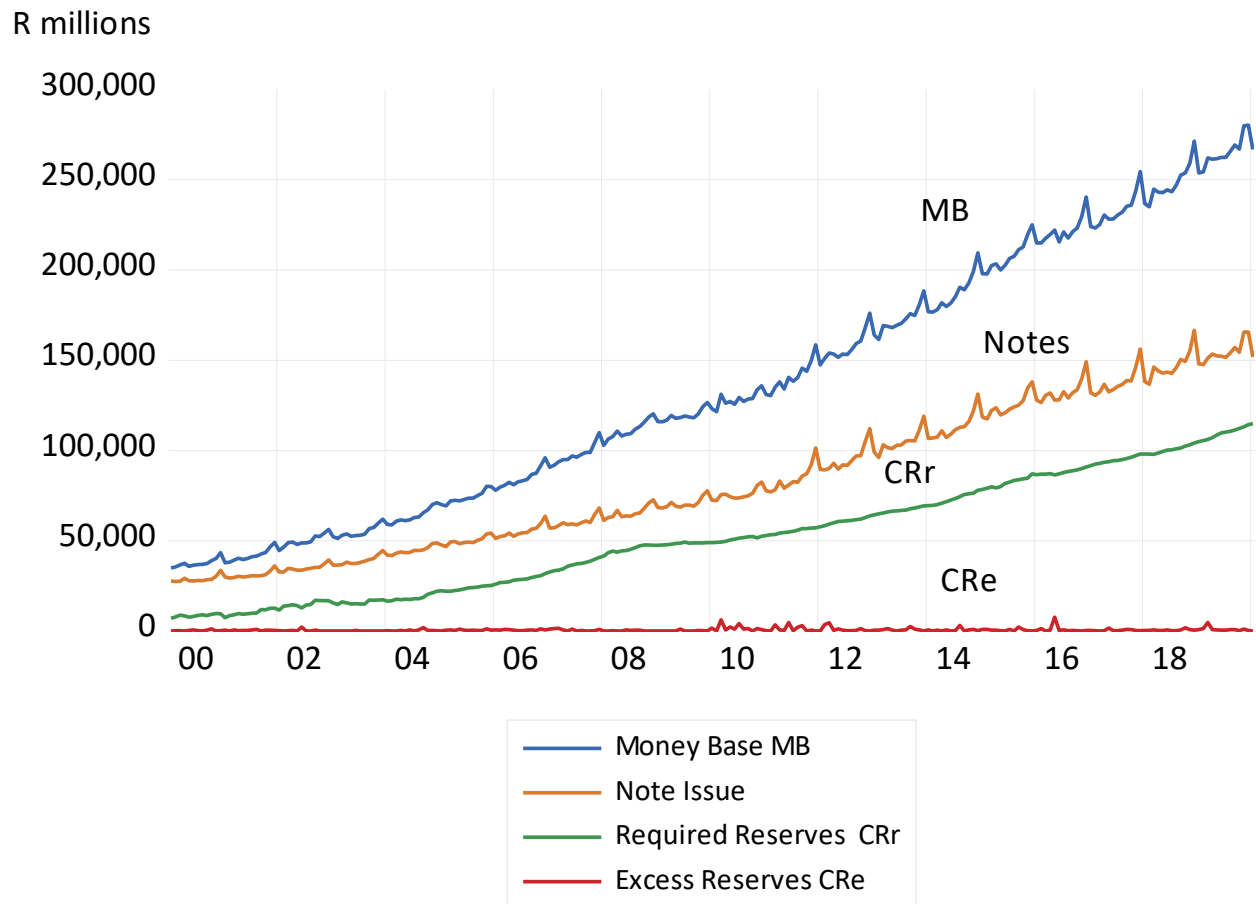
Definition and symbols

Reserve Bank Liabilities

Money Base or M0 (MB) = Notes (N) + Total Cash Reserves with Reserve Bank (CR)

Total cash Reserves (bank deposits with the Reserve Bank (CR)=
Required Reserves CRr and Excess Cash Reserves (CRe)

Fig. 9; Liabilities of the SA Reserve Bank



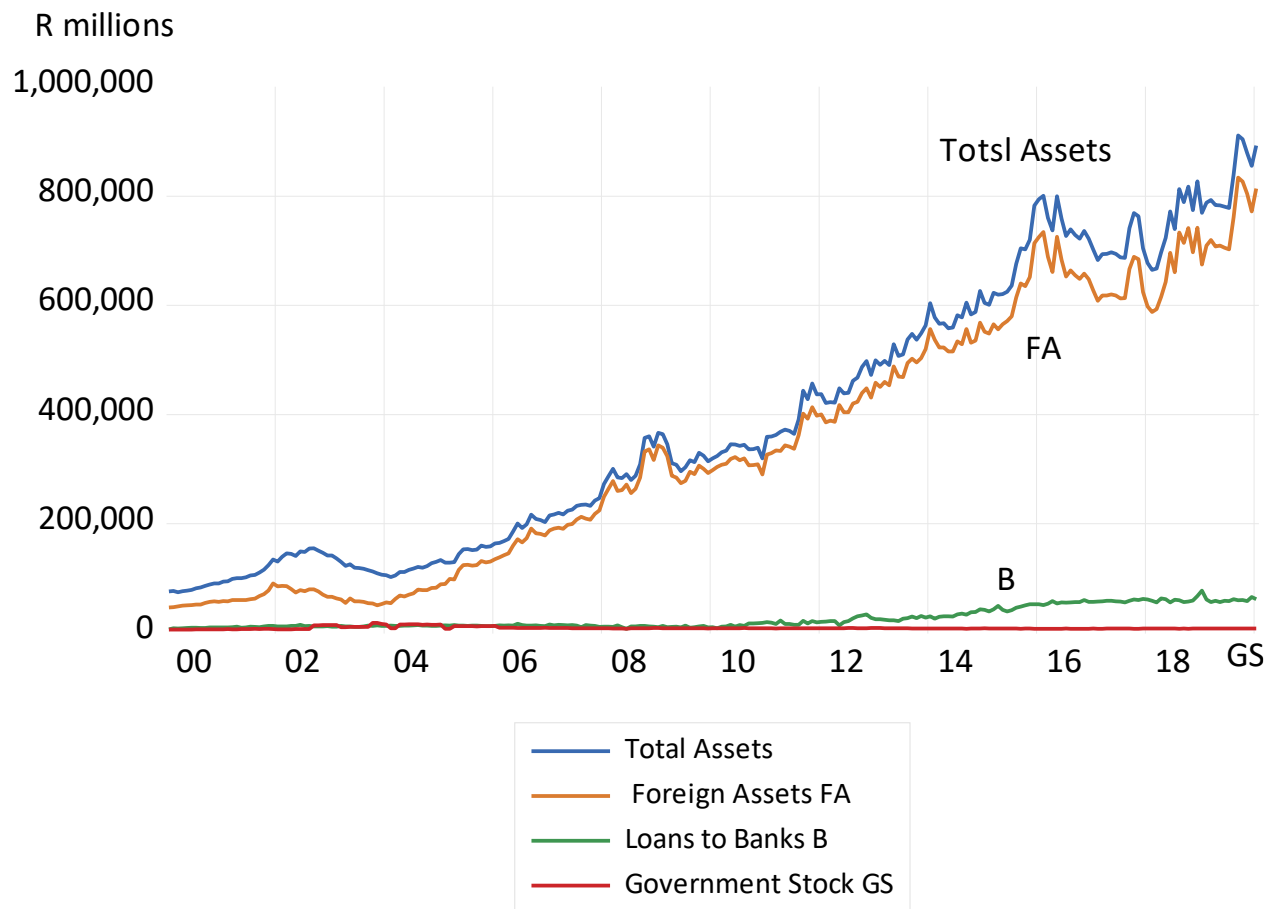
Source; SA Reserve Bank and Investec Wealth and Investment

The consistently small quantity of excess reserves held by the SA banks with the Reserve Bank should be noted and compared to the very large holdings of excess reserves held by US banks with the Fed.

The Asset side of the Reserve Bank Balance Sheet - The sources of the Money Base (MB)

$$MB = \text{Foreign Assets (FA)} + \text{Government Securities (GS)} - \text{Government Deposits (GD)} + \text{Bank Loans (B)}$$

Figure 10: Assets of SA Reserve Bank



Source; SA Reserve Bank and Investec Wealth and Investment

The minimal Reserve Bank holdings of Government Securities (GS) should be recognised as should the consistent reliance of the private

banks on loans provided by the central bank. Both will increase with QE and should be closely observed – as should the increase in the money base and bank credit and the broader categories of money.

Foreign Assets are accumulated through intervention by the Bank in the foreign exchange market. They increase when the Reserve Bank buys dollars for rands to prevent rand appreciation. They also increase with rand weakness as the foreign assets are revalued. The revaluation profits show up in other liabilities on the balance sheet – as equity reserves. Other things equal the increase in FA translates into a one for one increase in MB. However other things may not be equal – the impact on the MB may be sterilized through compensating sales of government stock GS. The Reserve Bank does not have enough by way of GS to sterilise on a significant scale. Its holdings of government securities are minimal as may be seen in figure

And so given the limited size of the Reserve Bank holding of RS bonds, the Treasury then has to step in to prevent the Reserve Bank's purchases of foreign currency from dealers and banks from adding unduly to the money base. This sterilization occurs when the Treasury sells additional government securities over and above its normal debt management operations and transfers the proceeds to its stabilization account held at the Reserve Bank. These transfers are reflected in the government deposit account on the liability side of the balance sheet. They have the effect of reducing MB as is shown- Increases in NDA (a negative influence on the MB) offsetting increases in FA.

Running down these government deposits to fund government spending would have the opposite effect- it would increase the MB. The difference between the government stock (GS) held by the Reserve Bank and the deposits of the government (GD) we define as Net Domestic Assets (NDA) which as may be seen is consistently negative-

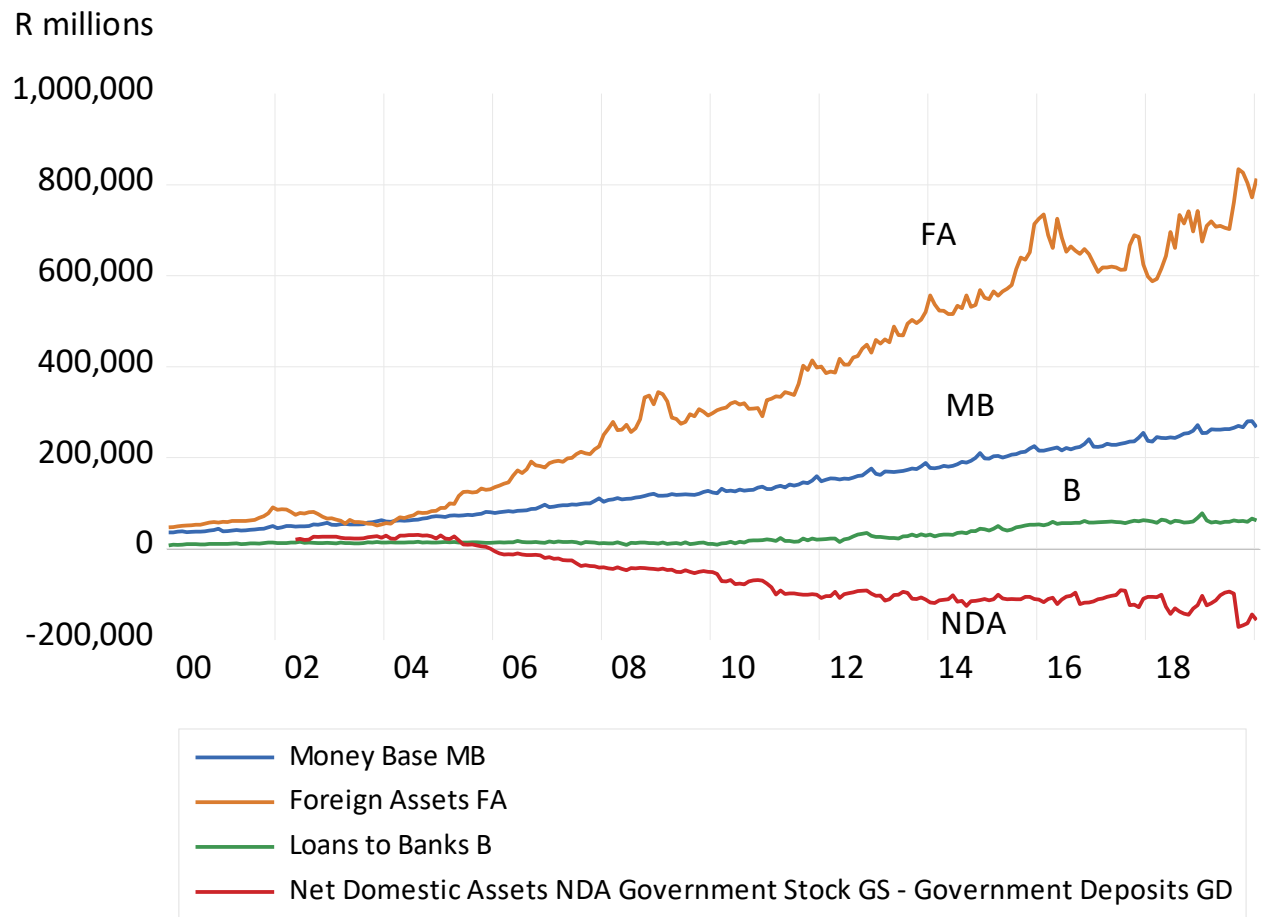
GD exceeding GS by significant amounts. The US Fed holds minimal holdings of foreign assets. It does not much intervene in the market for US dollars. And after all the dollars it supplies are treated as cash reserves every where else.

Liabilities and Assets of the Reserve Bank Reconfigured.

$MB = FA + \text{Net Domestic Assets (NDA)} + \text{Borrowed Reserves (B)}$

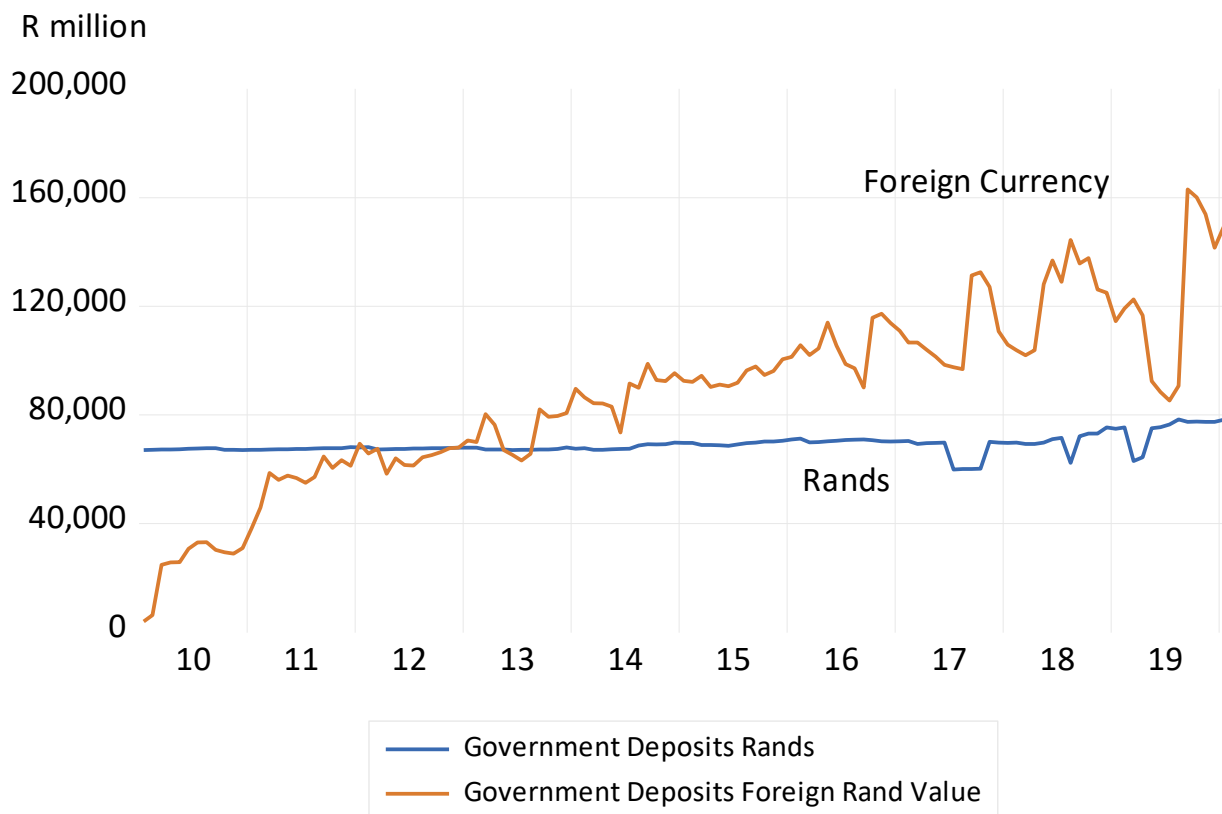
$NDA = \text{Government Securities (GS)} - \text{Government Deposits GD}$

Figure 11 The Assets of the Reserve Bank. Reconfigured



Source; SA Reserve Bank and Investec Wealth and Investment

Fig.12; The deposits of the government with the SA Reserve Bank



Source; SA Reserve Bank and Investec Wealth and Investment

Putting it all together in a money supply model.

Variables in the Model of the Money Supply Model

Endogenous Variables	Symbol	Exogenous Variables	Symbol
Broad Money Supply	M	Foreign Assets	FA
Money Base	MB	Net Domestic Assets	NDA
Notes and Coins	N	Required Reserve ratio	k
Total Reserves by Commercial Banks	CR	Excess Reserves	CR^E
Total Required Reserves	CR^R	Government Securities	GS
Borrowed reserves	BR	Government Deposits	GD
Total Deposits	D	Parameters	
Free Reserves	CR^F	Share of money held as notes and coins	n
		Share of money held as notes and coins by the public	n_p
		Share of money held as notes and coins by banks	n_b

Equations:

$$MB \equiv N + CR \quad \dots (1)$$

$$MB \equiv FA + NDA + BR \quad \dots (2)$$

$$NDA \equiv GS - GD \quad \dots (3)$$

$$CR \equiv CR^E + CR^R \quad \dots (4)$$

$$CR^R = kD \quad \dots (5)$$

$$CR^F \equiv CR^E - BR \quad \dots (6)$$

$$M \equiv N + D \quad \dots (7)$$

$$N = nM \quad \dots (8)$$

$$D = (1 - n)M \quad \dots (9)$$

Clearly $n = n_p + n_b$ and some simple algebraic manipulation allows us to write money as a multiplier times the sum of Foreign Assets (FA) and Net Domestic Assets (NDA), net of free reserves (CR^F).

$$M = \frac{1}{n_p(1-k) + n_b(1-k) + k} (FA + NDA - CR^F) \quad \dots (10)$$

We may then derive the ratio of Money to Money Base as

$$\frac{M}{MB} = \frac{1}{n_p(1-k) + n_b(1-k) + k} \left(\frac{FA + NDA - CR^E + BR}{(n_p + n_b)N + CR} \right) \quad \dots (11)$$

Further observations

Note in equation 10 and 11 that the money supply, broadly defined as notes plus bank deposits, will decline- by a multiple of CRf- the difference between excess and borrowed reserves of the banks, defined as free reserves- reserves held after deducting borrowed reserves. In the case of the US these free reserves are now a very large amount as we have shown. The cash reserves of US banks vastly exceed the reserves they are required to hold by regulation – so dragging down the money supply by the multiple indicated and the money multiplier M2/M0 as we have shown in figure 5 above. In the case of South Africa free reserves have a large negative value. The reserves (cash) borrowed by banks from the Reserve Bank have vastly exceeded their minimal holdings of excess reserves. Hence CRf in the equations takes on a positive number

and adds to the money supply by a multiple factor. Hence the money multiplier in SA has remained consistently high as we show in figure 4 above.