Week Six

EPA143A

EXOGENOUS MONEY versus ENDOGENOUS MONEY

S. STORM & C.W.M. NAASTEPAD

LECTURE NOTE W-7

The required readings of Week 7 include:

- Lecture Note EPA143A 2020-21 Week 7
- K. Fury. 2013. A Reading on Money and Money Creation. *Forum for Social Economics* 42 (1): 38-58. (Posted on Brightspace).

Supplementary videos:

- https://www.youtube.com/watch?v=SkAzDrrKkME an explanation and a critique of the money multiplier model
- Josh Ryan-Collins, Tony Greenham, Richard Werner, Andrew Jackson (2011) Where does money come from? https://www.youtube.com/watch?v=I7L3ZtCSKKs
- Pink Floyd: Money https://www.youtube.com/watch?v=cpbbuaIA3Ds

Lecture Note W-7 and the exercises of Week 7 are part of the exam materials.

"The process by which money is created is so simple that the mind is repelled. Where something so important is involved, a deeper mystery seems only decent." —
John Kenneth Galbraith (1975)
Money: Whence It Came, Where It Went

"When banks extend loans to their customers, they create money by crediting their customers' accounts."
Mervyn King, (former) Governor of the Bank of England

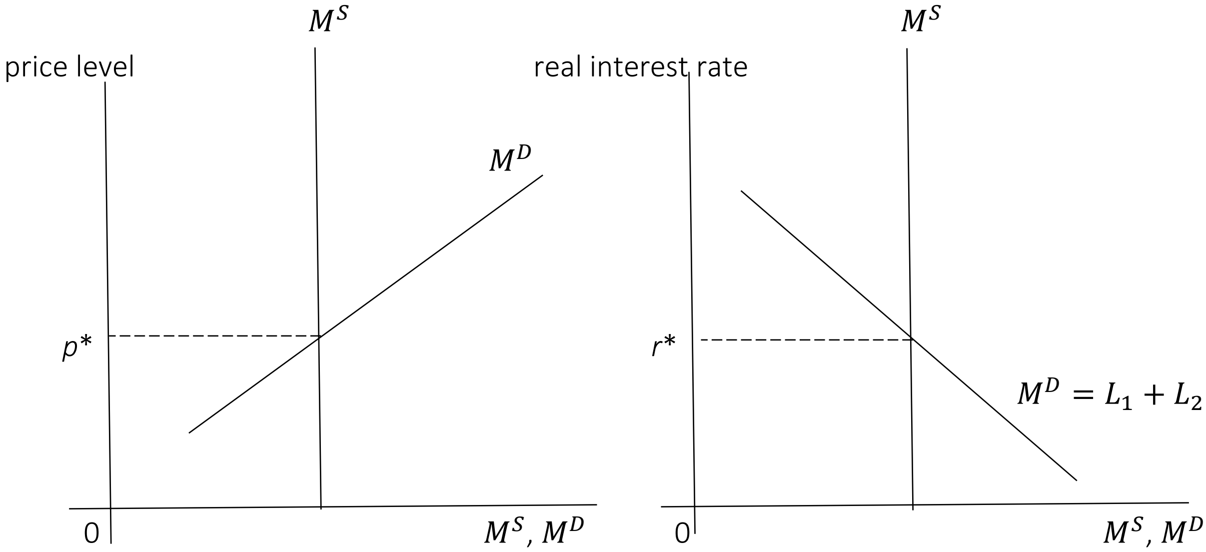
Introduction

In macro-economics, there exist opposing views of how money is created in the economy. In general, we can say that macro-economists are confused about money, money creation, and the role of (central) banks. We can distinguish two main views.

The first view is called the 'exogenous money' view, as it assumes that M^S is exogenous (because it is directly determined by the central bank). This is the traditional, pre-Keynesian, view, which is held by a majority of economists, commentators and policymakers. We have encountered the 'exogenous money' view in our discussions of the *neoclassical* macro-economic model and the *IS-LM model*, in which it is assumed that money supply is exogenous, *i.e*. it is a monetary policy instrument under the control of the central bank. Figure 1 presents a visualization of the money market in the neoclassical model (left panel) and in the IS-LM model (right panel). The M^S-curve is vertical, because money supply is determined by the central bank. Suppose the central bank decides to allow M^S to increase, the M^S-curves will shift to the right. In the neoclassical model, the increase in M^S results in a higher general price level (inflation). In the IS-LM model, the increase in M^S leads to a decrease in the real interest rate. By increases in M^S, the central bank can influence the macro-economy: creating inflation in the neoclassical model or generating higher investment and growth in the IS-LM model (by lowering the interest rate).

In these models it is assumed that the central bank has a means to directly and predictably determine the quantity of money in circulation; after all, without such direct and predictable control, M^S would not be useful to the central bank as an instrument of monetary policy. How does the central bank manage to exert direct control over M^S in these two models? We will answer this question below – in the discussion of the Money Multiplier Model.

Figure 1



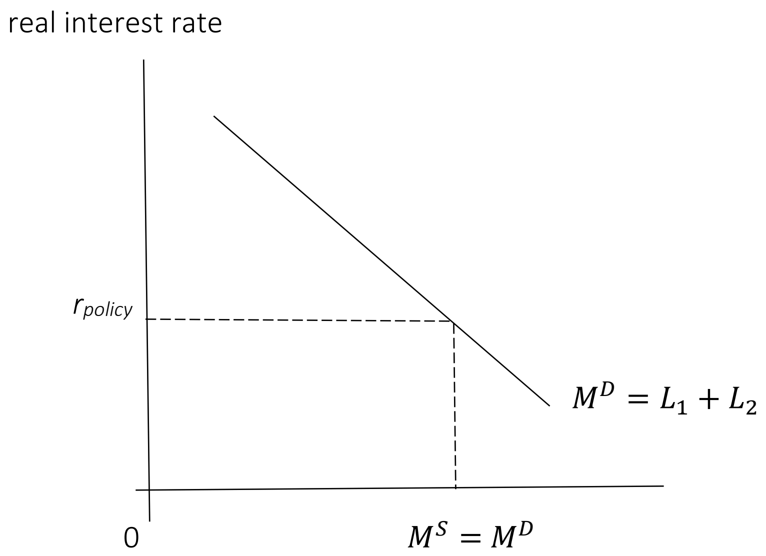
The money market in the neoclassical model (The M^D-curve is upward-sloping, because the transaction demand for money will rise if the general price level increases).

The money market in the IS-LM model (The M^D-curve is downward-sloping, because L_2 will increase if the interest rate goes down.)

The <u>second view</u> is the '<u>endogenous money</u>' view, which holds that M^S is endogenous, *i.e.* determined by whatever is the demand for money, and cannot be directly and predictably determined by central banks. Central banks can at best influence M^S indirectly, by using the interest rate as the instrument of monetary policy, but this influence is neither straightforward nor predictable. The 'endogenous money' view is consistent with the *Keynesian macro-model*, as is illustrated in Figure 2. The central bank chooses a particular interest rate; this interest rate determines M^D, together with nominal GDP and the liquidity preference of financial speculators. Money supply will adjust to (whatever is) money demand.

Central banks can only influence M^S by using the interest rate to influence M^D. But the sensitivity of money demand to the interest rate is not constant or predictable. Central banks have acknowledged (in recent times) that they do not have the power to directly control M^S and that therefore, the 'endogenous money' approach is the 'true' approach. Central banks use the interest rate as their policy instrument – to influence the macro-economy – and not M^S.

Figure 2



The money market in the Keynesian model
(Note that there is no M^S-curve. The interest rate determined by the central bank determines M^D and M^S will adjust to M^D.)

Exogenous money: The Money Multiplier Model

In the neoclassical model and the IS-LM model, it is assumed that the central bank has the power of direct control over the supply of money M^S. The Money Multiplier Model explains how this is supposed to work.

In the Money Multiplier Model, the process of money creation starts as the central level, as the central banks decides to 'print' new money: coins and paper money. Let us assume that our central bank decides to print €1000 million of new money. The new cash or 'currency' does not yet increase money supply, because it has not yet been brought into circulation. M^S is money in circulation (in the economy); all money kept by and within the central bank is not counted as being part of M^S. The central bank now has to bring the €1000 million into circulation.

We assume that the central bank will do this by buying (government) bonds from the public. Some bond-owners are willing to sell their bonds in exchange for cash; the central bank becomes the new owner of these bonds (which it buys with newly minted money). The new money will be deposited in the commercial-bank accounts of the bond-sellers. Let us simplify the analysis and assume that all new money (€1000 million) is deposited in bank ABC-OMRA. The change in the balance sheet of commercial bank ABC-OMRA is as follows:

Balance sheet ABC-OMRA

assets	liabilities
Δ cash reserves $= €1000$ m	Δ deposits $= €1000$ m

The deposits are recorded on the liability side of the balance sheet; these cash deposits constitute a liability (= a debt) to ABC-OMRA, on which the bank has to pay interest. At the same time, the cash reserve (held by the bank) increase by €1000 million (since ABC-OMRA receives the new money). As in the neoclassical loanable funds model, ABC-OMRA has received new loanable funds, which it will use to issue new loans to firms and households.

But ABC-OMRA can only use a proportion of the new deposits as loanable funds, because it is obliged to keep a fixed proportion ρ (the cash-reserve ratio) of the additional deposits as cash. The cash reserve ratio, set by the central bank, is the percentage of a commercial bank's deposits that it must keep in cash as a reserve in case of mass customer withdrawals. Central banks set cash reserve ratios to ensure that commercial banks like ABC-OMRA have money on hand to prevent them from running out of cash ('liquidity') in the event of panicked depositors wanting to make mass withdrawals. If a commercial bank does not have the funds to meet its reserve, it can borrow funds from the central bank to satisfy the requirement. Let us assume that $\rho = 0.1$ (10%). Bank ABC-OMRA has to keep €100 million as cash reserve in its vaults and can use €900 million to originate new loans.

The Money Multiplier Model assumes that commercial banks are always and everywhere fully loaned-up. This is the key assumption underlying the workings of the Money Multiplier Model: there is always an unmet (latent) demand for loans, such that commercial banks are able to use all their loanable funds to issue new credit (after subtracting the cash reserve requirement). In terms of the IS-LM model, this would mean that there is always enough money demand, if banks lower the interest rate sufficiently (in the right panel of Figure 1). Assuming that bank ABC-OMRA is fully loaned-up, it will issue €900 million new loans and keep €100 million as a cash reserve.

These changes are shown in the second balance sheet of ABC-OMRA:

Balance sheet ABC-OMRA

assets	liabilities
Δ cash reserves $= €100$ m Δ loans $= €900$ m	Δ deposits $= €1000$ m

Let us assume that agro-business firm John Dear PLC borrows the €900 million from bank ABC-OMRA to buy new capital goods. John Dear PLC deposits the €900 million in its house-bank INP. (John Dear PLC will use the money in its account to buy machines at some point, but this aspect of the story is immaterial to the workings of the Money Multiplier Model). Let us consider the changes in the balance sheet of commercial bank INP:

Balance sheet INP

assets	liabilities
Δ cash reserves $= €\ 90$ m Δ loans $= €810$ m	Δ deposits $= €\ 900$ m

Bank INP receives €900 million as deposits (on the liability side of its balance sheet). It has to keep €90 million (= 10%) as a required cash reserve and it can use the remaining €810 million to originate new loans. Like bank ABC-OMRA, bank INP is always fully loaned-up. It has no problems to lend the €810 million. The story continues: locomotive producer Bimbardier Transportation borrows the €810 million from bank INP (to expand its production facilities) and deposits the money in its own bank Banca Monte dei Paschi (the world's oldest bank, founded in 1472). The balance sheet of this bank changes as follows:

Balance sheet Banca Monte dei Paschi

Assets	liabilities
Δ cash reserves $= €\ 81$ m Δ loans $= €729$ m	Δ deposits $= €\ 810$ m

This is the third round of the Money Multiplier process. Let us do one further round. To build a new factory, multinational firm Rhône-Poubelle borrows €729 million from the world's oldest bank and it deposits the money in the reputable French-Belgian commercial bank Dixea. (Banca Monte dei Paschi is also fully loaned-up). The balance sheet of Dixea changes as follows:

Balance sheet Dixea

Assets	liabilities
Δ cash reserves $= €\ 72.9$ m	Δ deposits $= €\ 729$ m
Δ loans $= €656.1$ m	

It is obvious by now that fully loaned-up Dixea will be able to originate new loans with a value of €656.1 million. Figure 3 shows that after about 73 rounds $\Delta\ \textbf{deposits} = \mathbf{0}$ and the money multiplier process peters out. In each round of depositing – borrowing – depositing, new commercial bank deposits will be created. Figure 4 shows that the cumulative value of new deposits created in this process is €10.000 million.

The newly created deposits constitute money. After all, each deposit-holder can withdraw as much money from his/her bank account, as was deposited in that account. The bond-seller who received €1000 million from the central bank, can withdraw (and use) €1000 million – even if bank ABC-OMRA used €900 million to issue loans (and only has a cash reserve of €100 million). John Dear PLC has €900 million at its disposal in bank INP, even if bank INP has a cash reserve of just €90 million; and so on. The newly created deposits constitute 'deposit-money' – an (electronic) claim on your commercial bank which you can use to pay your bills. In the money multiplier process, €10.000 million of deposit money is created – even if commercial banks have only €1000 million real cash in their vaults. Deposit money is fiduciary money: deposit-holders trust that if they pay their bills by transferring deposit money from (say) INP to Dixea, the payee will accept the transferred deposit money as a means of payment. It should be clear – at this point – that banks will not be able to provide us with *real money* if all deposit-holders try to withdraw their money (as cash) from their banks at the same moment of time. Banks would in that case face a liquidity crisis: an absolute shortage of real cash. If the public begins to distrust a specific bank and to increasingly withdraw money (or transfer its deposit money to another -safer – bank), this may lead to a run on the bank, which could lead to the bankruptcy of this bank.

Figure 3

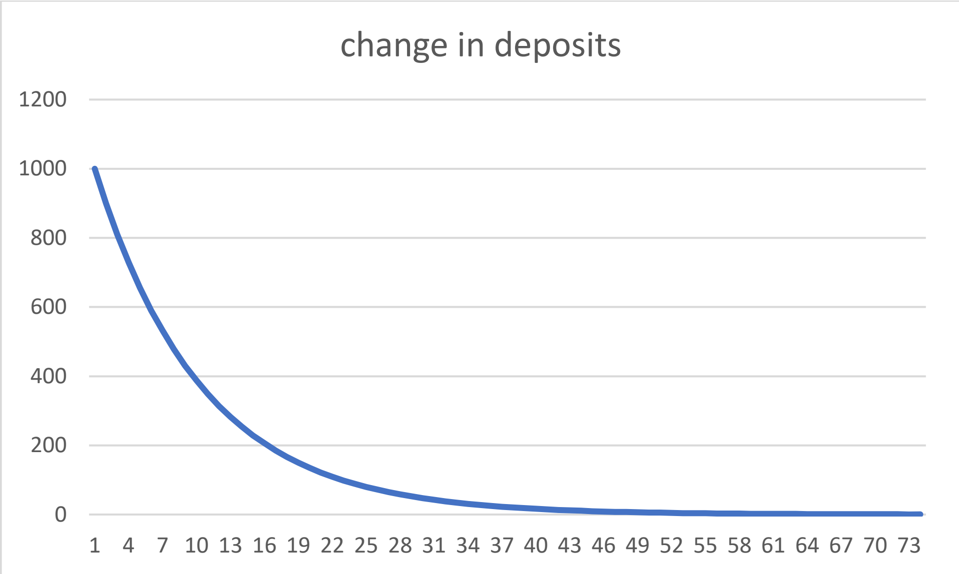
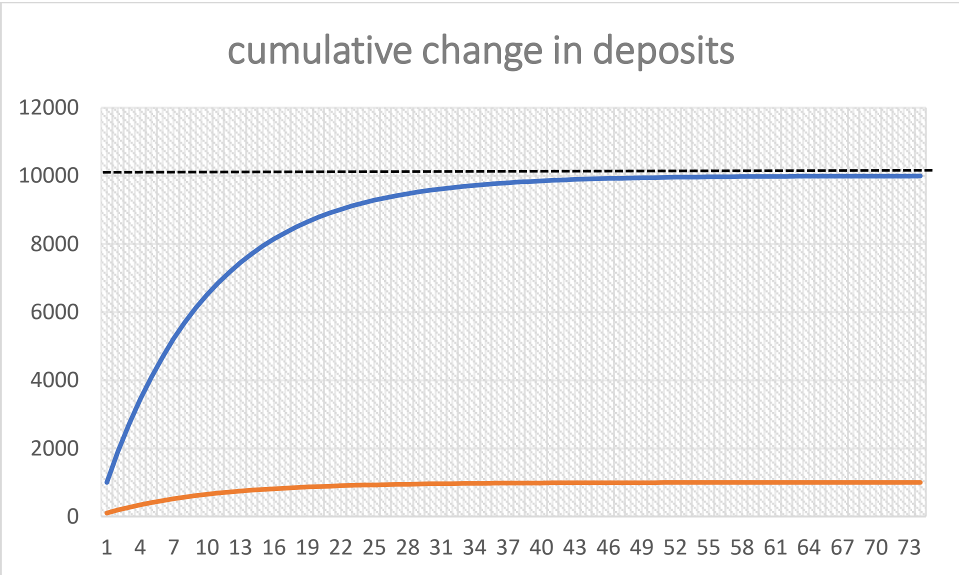


Figure 4



It is claimed that the Money Multiplier Model can reliably predict how much deposit money will be created in response to an increase in money supply, engineered by the central bank. This works as follows. There exists a proportional relationship between the cash reserves *R* of the banking system and total deposits *D*:

$$(1) \qquad R = \rho \times D$$

<u>If commercial banks are always fully loaned-up</u>, this relationship is fixed and predictable, and we can re-write equation (1) as follows:

(2) $$D = \left[\frac{1}{\rho}\right] \times R$$

The total amount of deposits *D* the commercial banking system is able to create, depends on $\left(\frac{1}{\rho}\right)$ = 1/(cash reserve ratio) and the amount of cash reserves *R* held by these banks. Equation (2), since it is a stable relation, can be written in terms of changes as well:

(3) $$\Delta\, D = \left[\frac{1}{\rho}\right] \times \Delta\, R$$

Let us consider our example. The central bank started the money multiplier process by printing €1000 million new money and bringing it in circulation. One tenth of the new money (€100 million) is kept as a cash reserve by ABC-OMRA; this means $\Delta\, R = 100$ in the first round. Bank INP keeps (€90 million) as a cash reserve; this means $\Delta\, R = 90$ in the 2nd round. In the 3rd round, Banca Monte dei Paschi keeps (€81 million) as a cash reserve ($\Delta\, R = 81$) and in the 4th round, Dixea Bank keeps (€72.9 million) as a cash reserve ($\Delta\, R = 72.9$). Already after just four rounds, €343.9 million of the newly printed €1000 million has ended up as cash reserves in the commercial banking systems. Figure 5 shows that all new money ends up as cash reserves in commercial banks.

This means that $\Delta\, R = 1000$, when the central bank prints €1000 million new money and manages to bring it in circulation. Because $\rho = 0.1$, the money multiplier $\left[\frac{1}{\rho}\right] = 10$. Hence, we can predict that commercial banks will create €10.000 million of deposit money, based on the €1000 million of new money printed by the central bank:

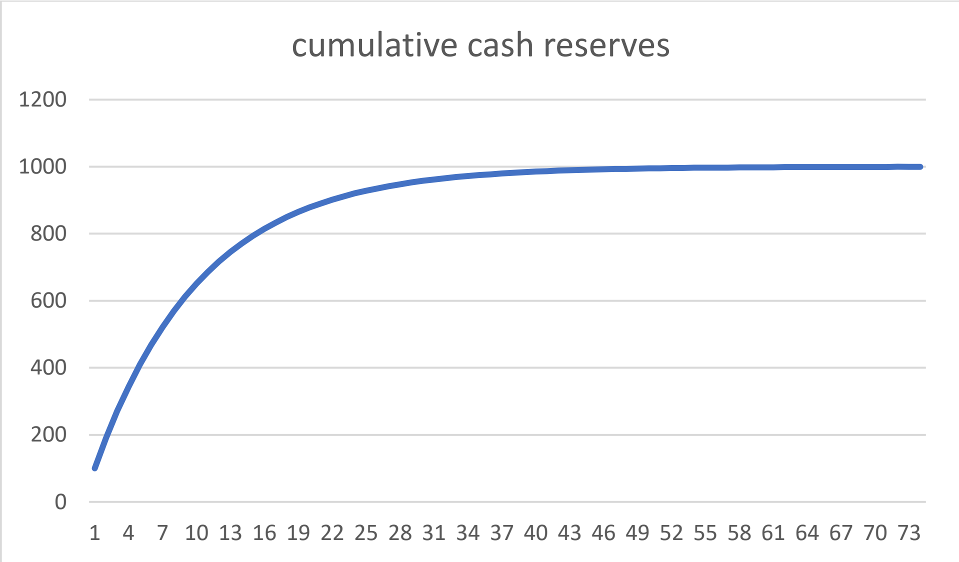
(4) $$\Delta\, D = \left[\frac{1}{\rho}\right] \times \Delta\, R = 10 \times 1000 = 10.000$$

Money supply, or money in circulation, will increase by €10.000 million, because:

(5) $$\Delta\, M^S = \Delta D = 10.000$$

Money supply consists of currency (= cash in circulation) and of deposit money (*i.e*. money created by commercial banks). Currency is created centrally by the central bank; deposit money is created at the decentralised level by commercial banks. In modern economies, around 95% of M^S is deposit money; only 5% or less is money created by the central bank. How can central banks control money supply if most of the money in circulation is created locally by commercial banks?

Figure 5



To answer this question, we can use equations (2) and (5) to obtain:

(6) $$M^S = Currency + D = Currency + \left(\frac{1}{\rho}\right) \times R$$

Note that $\left(\frac{1}{\rho}\right)$ = the money multiplier. The demand for currency (cash held in our wallets) is assumed to be constant (or stable). From the point of view of a central bank and <u>assuming that commercial banks are fully loaned-up</u>, money supply can be seen as a function of the cash-reserve ratio ρ and cash reserves R. In our example, assuming that $\rho = 0.1$, the <u>money-multiplier</u> $\left(\frac{1}{\rho}\right) = 10$. If the relationship between R and M^S in equation (6) is stable, the central bank can use the cash-reserve ratio ρ and cash reserves R as instruments of monetary policy.

Suppose the central banks wants to reduce M^S. If it increases ρ to 0.125, this will reduce the money-multiplier $\left(\frac{1}{\rho}\right)$ to 8 - for the same R, M^S will be smaller, because commercial banks have to hold more cash as a reserve and can therefore create less deposit money than before.

If the central bank decides to increase M^S, it can increase R (as in our example), or it reduces the cash-reserve ratio. Using these two handles, the central bank is able to control money supply – and this justifies why the M^S-curve in Figure 1 is <u>vertical</u>. By controlling money supply in this manner, central banks are supposed to control inflation (in the neoclassical model) or to influence real GDP and inflation (via the interest rate) in the IS-LM model.

A strong point of the Money Multiplier Model is that it shows that most of what we see as money, is deposit money created at the decentralised level by (deposit-money creating) commercial banks. This is certainly realistic – because (as we stated before) 95% or more of M^S is deposit money.

The weak spot of the Money Multiplier Model is that it purports to show that central banks can indeed control M^S by the use of ρ and *R*. This is incorrect and not in line with reality. Central banks have given up the use of ρ and *R* as instruments to manage M^S. In fact, central banks are no longer closely monitoring M^S, because they have come to the realisation that money supply cannot be directly controlled by them (using ρ and *R*). In reality, central banks use the interest rate as their policy instrument (as in Figure 2), acknowledging that they can influence money and inflation only (very) indirectly.

The fatal problem of the Money Multiplier Model is the assumption that commercial banks will always be fully loaned-up. This need not be the case and indeed most of the time it is not the case. However, if banks are not fully loaned -up, the stable predictable relationship between money supply and cash reserves (held by banks) breaks down.

To illustrate this, let us return to the 1st round in our example and look at the balance sheet of ABC-OMRA. Suppose that there is not enough demand for loans: firms are not borrowing, because they expect that economic growth will be low in the next couple of years (animal spirits are depressed).

Let us assume that ABC-OMRA can only issue € 500 million of new loans, which means it is left with € 500 million of cash reserves:

Balance sheet ABC-OMRA

assets	Liabilities
Δ cash reserves $= €500$ m	Δ deposits $= €1000$ m
Δ loans $= €500$ m	

Commercial bank ABC-OMRA will use the excess cash of € 400 million for purposes of profit-making, buying bonds or other financial instruments, but this money will not end up in circulation in the real economy and therefore is not part of money supply. The € 400 million remains within the financial system.

Hence, instead of € 900 million in a fully loaned-up scenario, now only € 500 million is borrowed and then deposited in INP bank:

Balance sheet INP

Assets	liabilities
Δ cash reserves $=$ € 300 m	Δ deposits $=$ € 500 m
Δ loans $=$ €200 m	

Let us here assume that INP Bank can only issue € 200 million (instead of the maximum € 450 million), and again actual cash reserves are much higher (€ 300 million) than what is required (€ 50 million). The loan of € 200 million by Bimbardier Transportation is deposited in Banca Monte dei Paschi (as before), but the world's oldest bank cannot find any borrowers to lend to. Hence the € 200 million end up as cash reserve in this bank. The process of deposit money creation has stopped after only three rounds.

Balance sheet Banca Monte dei Paschi

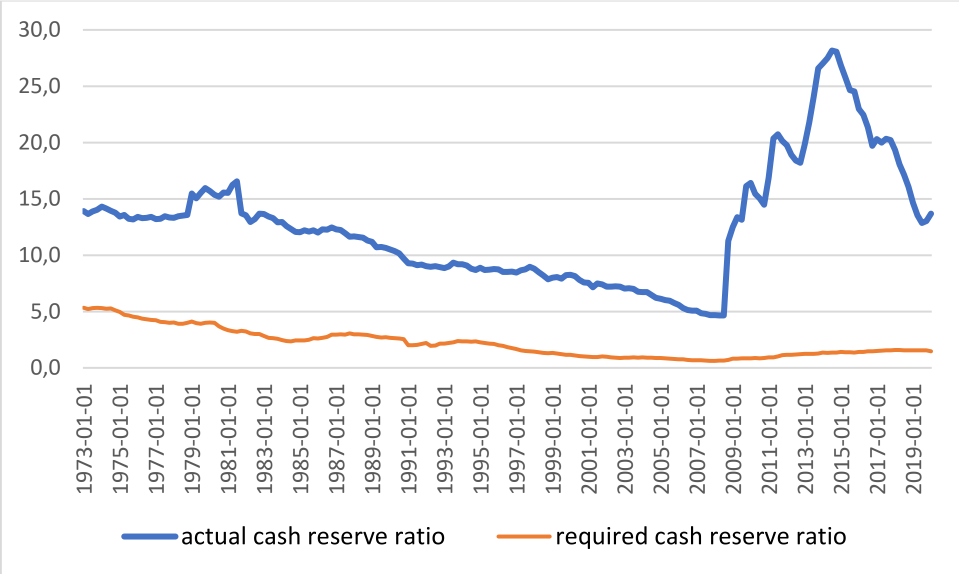
Assets	liabilities
Δ cash reserves $=$ € 200 m	Δ deposits $=$ € 200 m
Δ loans $=$ 0	

How much deposit money did the commercial-banking system manage to create on the basis of the € 1000 million of new money printed by the central bank? The answer is:

$\Delta\text{ deposits} = 1000 + 500 + 200 = 1700\text{ m}$. The increase in money supply therefore is equal to: $\Delta\, M^S = \Delta D = 1700 = €1.700\text{ million} < €10.000$ million. Note that cash reserves are € 1000 million, because as before, all new money created by the central bank ends up as cash reserves *R*.

What the example shows is that the relationship between cash reserves *R* and money supply is <u>not stable or predictable</u>. In the example, the actual money multiplier (ex-post) has a value of only 1.7 (because the € 1000 million of reserve money increase money supply by € 1700 million) – and not 10 (when banks are fully loaned-up). Because the value of the money multiplier is not stable or predictable (because banks are not fully loaned-up), the variables ρ and *R* are useless as instruments of monetary policy.

Figure 6
U.S. commercial banks:
Actual versus requires cash reserve ratio: 1973-2020

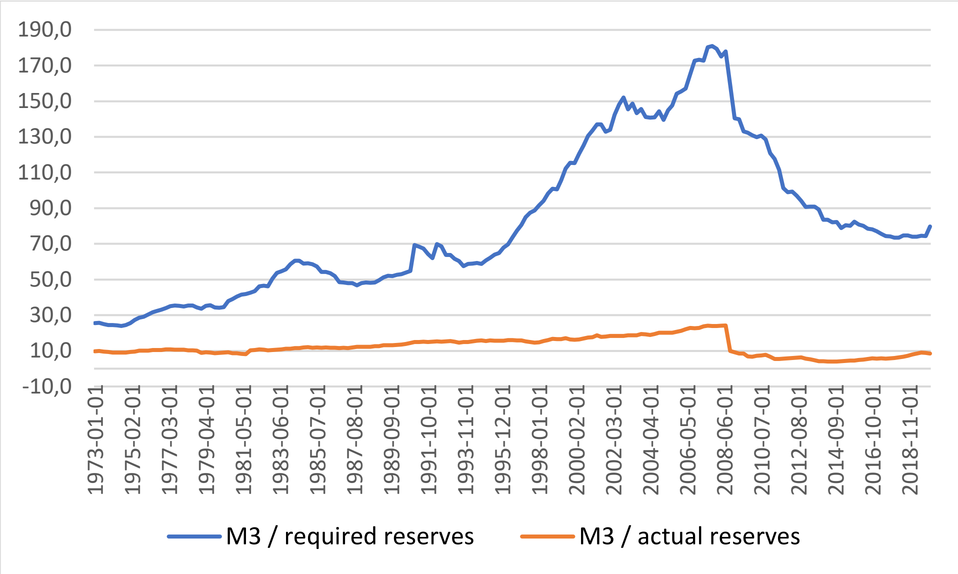


Source: Federal Reserve Bank of St Louis FRED Database
data-series CASACBW027SBOG, DPSACBW027SBOG & REQRESNS
https://fred.stlouisfed.org/

Figure 6 provides empirical evidence for U.S. commercial banks on the required cash reserve ratio (ρ) and the actual (ex-post) cash reserves (as a percentage of bank deposits) for the period 1973-2020. It can be seen that the required cash reserve ratio $\rho = 0.04$ (or 4%) in the early 1970s; this means that the money-multiplier $\left(\frac{1}{\rho}\right) = \frac{1}{0.04} = 25$. The required cash ratio declines over time to around 1.3% in 2020, which gives a very large money-multiplier $\left(\frac{1}{\rho}\right) = \frac{1}{0.013} \approx 77$. This is shown in Figure 7. It can be seen that the money multiplier peaks with a value of 180 in 2007. The mean value of the money multiplier during 1973-2020 is 81 with a standard deviation of 42.3. Clearly, the money multiplier is neither stable nor predictable.

Actual cash holdings of U.S. have been much higher than what was required (Figure 6): the actual cash reserve ratio was 14% in the 1970s, which gives an actual money multiplier of around 8 (see Figure 7). Actual cash holdings declined from 14% of deposits in 1973 to 4.7% of deposits in Q2 of 2008, but actual cash holdings increased considerably following the financial crisis of 2008-09. In 2011, cash holdings of U.S. commercial banks were 20% of deposits – which gives an actual money multiplier of (only) 6. Actual cash holdings in 2020 are 14% of deposits. the mean value of the money multiplier when calculated based on actual (excessive) cash holdings during 1973-2020 is 12.3 with a standard deviation of 5.1.

Figure 7
The money multiplier of the U.S. economy:
Actual versus requires cash reserve ratio: 1973-2020



Source: Federal Reserve Bank of St Louis FRED Database
data-series CASACBW027SBOG, REQRESNS & MABMM301USM189S
https://fred.stlouisfed.org/

The evidence provided in Figures 6 and 7 should be sufficient to justify the conclusions that (*a*) commercial banks are normally less than fully loaned-up; (*b*) the money-multiplier is not stable or predictable; and (*c*) central banks cannot therefore directly control or manipulate money supply. Let us now consider the alternative theory of money creation: the 'endogenous money' view.

Endogenous money: money in our economies

> "Where does money come from? In the modern economy, most money takes the form of bank deposits. But how those bank deposits are created is often misunderstood. The principal way in which they are created is through commercial banks making loans: whenever a bank makes a loan, it creates a deposit in the borrower's bank account, thereby creating new money. This description of how money is created differs from the story found in some economics textbooks." (Bank of England)

In the 'endogenous money' view, commercial banks have the ability to create money ex-nihilo, without having received money deposited in their accounts. The 'endogenous money' is consistent with the Keynesian macro-model in which business investment is pre-financed by new credit, issued by commercial banks. How can a commercial bank create new money? Let us go back to bank ABC-OMRA and see how this bank does create money by making a loan. The opening balance sheet of commercial bank ABC-OMRA has the following entries:

Balance sheet ABC-OMRA – June 2, 2020

assets = 'active'		liabilities = 'passive'	
cash reserves	= €100 m	deposits	= €1000 m
loans	= €1200 m	inter – bank loans	= €200 m
govt. bonds	= €200 m	equity	= €300 m
total	= €1500 m	total	= €1500 m

Clients of ABC-OMRA have deposited € 1000 million in the accounts of this bank. The required cash-reserve ratio is 10% and ABC-OMRA therefore has a cash reserve of € 100 million. ABC-OMRA has issued € 1200 million in loans and invested € 200 million in government bonds. Its total assets (= what it owns) on June 2, 2020 are € 1500 million. These assets are financed by the bank's liabilities (= what it owes): the deposits of € 1000 million, loans from other banks (€ 200 million) and equity (€ 300 million), which is money invested in this bank by its shareholders.

Let us suppose that firm Hi-Tech Unlimited approaches bank ABC-OMRA with the request for a 10-year loan of € 100 million to finance the construction of a new factory to produce Hi-Tech Unlimited's novel zero-carbon electric car. The firm provides the bank with an investment appraisal, a forecast of expected car sales, expected costs and expected returns (in the next decade), and of the risks and uncertainties involved in the proposed investment project. Bank ABC-OMRA staff evaluate the proposal and do the due diligence (including an environmental impact assessment), after which they decide to fund this project. Hi-Tech Unlimited will be given the € 100 million loan – against the 'proposal'.

Bank ABC-OMRA will write the loan contract – and once the loan contract is signed by Hi-Tech Unlimited, the new loan will be added to the bank's accounts. The first change to the balance sheet happens on the ASSET side (which is the active side, or 'activa' side): the total amount of loans increases by € 100 million from € 1200 million to € 1300 million. Let us repeat this important point: unlike in the Money Multiplier Model (in which a bank first has to received deposits at the liability side, before it is capable of originating a new loan on the asset side of its balance sheet), real-life money creation starts on the active (asset) side of the balance sheet with the creation of debt. This is why 'money = debt'.

The second change to the ABC-OMRA balance sheet occurs on the LIABILITY side (the 'passive' or 'passiva' side): after creating the loan of € 100 million, bank ABC-OMRA will open a deposit account for Hi-Tech Unlimited with a (positive) balance of € 100 million. Hi-Tech Unlimited can now withdraw money from its account to pay for the investment project. Total assets have increased (firstly) to € 1600 million and then total liabilities rise to € 1600 million as well. Creating the loan (and next creating the deposit account) has enlarged the balance sheet of ABC-OMRA by € 100 million. What is more, by the simple act of writing the loan contract (first) and next creating the € 100 million deposit, money supply M^S has grown by € 100 million (of deposit money). This is how decentralized commercial banks can and do create money.

We can now understand the two statements which appear at the start of the Lecture Note:

"The process by which money is created is so simple that the mind is repelled. Where something so important is involved, a deeper mystery seems only decent." —
John Kenneth Galbraith (1975) *Money: Whence It Came, Where It Went*

"When banks extend loans to their customers, they create money by crediting their customers' accounts." Mervyn King, (former) Governor of the Bank of England

Balance sheet ABC-OMRA – June 2, 2020

assets = 'active'		liabilities = 'passive'	
cash reserves	$= €100$ m	deposits	$= €1000 + 100$ m
loans	$= €1200 + 100$ m	inter – bank loans	$= €200$ m
govt. bonds	$= €200$ m	equity	$= €300$ m
total	$= €1600$ m	total	$= €1600$ m

Note: the change (in red) on the asset side of the balance sheet comes first. In response to change on the active side, the liability side (the passive side) has to adjust by an increase in deposits (in blue). Red = cause; blue = effect.

Bank ABC-OMRA is finished with the creation of new money (€ 100 million). But it still faces the important task of liquidity or cash management. This task of liquidity management arises from the fact that commercial banks such as ABC-OMRA have to meet the cash-reserve requirement (imposed by the central bank) of keeping a cash balance with a worth of 10% of its outstanding deposits. In the new situation (after the money creation), bank ABC OMRA has deposits worth € 1100 million; this means that its cash reserve should be € 110 million. We can immediately see that bank ABC-OMRA is € 10 million short of cash (relative to the cash reserve requirement).

ABC-OMRA needs to obtain € 10 million of extra liquidity (or cash). This it can do in various ways, as we will see below. Before proceeding, it is important to emphasize that the liquidity management by this bank, however important, is a task which is separate from the process of money creation.

Liquidity management

To obtain the € 10 million cash, bank ABC-OMRA may decide to sell government bonds in exchange for cash. This is illustrated in the next balance sheet. Selling bonds for cash concerns only the asset-side of the balance sheet; balance sheet totals do not change; the composition of bank assets changes – lowered bond holdings in exchange for higher cash holdings.

Balance sheet ABC-OMRA – June 2, 2020

assets = 'active'	liabilities = 'passive'
$\text{cash reserves} = €100 + 10\text{ m}$	$\text{deposits} = €1100\text{ m}$
$\text{loans} = €1300\text{ m}$	$\text{inter-bank loans} = €200\text{ m}$
$\text{govt. bonds} = €200 - 10\text{ m}$	$\text{equity} = €300\text{ m}$
$\text{total} = €1600\text{ m}$	$\text{total} = €1600\text{ m}$

A second way to manage liquidity in line with cash-reserve requirements involves bank ABC-OMRA taking a (short-term) loan from another bank (say, INP Bank or the central bank). Inter-banks loans of ABC-OMRA increase by €10 million; the money is put into the cash reserve which therefore also increases by €10 million. Balance sheet totals rise by €10 million.

Balance sheet ABC-OMRA – June 2, 2020

assets = 'active'	liabilities = 'passive'
$\text{cash reserves} = €100 + 10\text{ m}$	$\text{deposits} = €1100\text{ m}$
$\text{loans} = €1300\text{ m}$	$\text{inter-bank loans} = €200 + 10\text{ m}$
$\text{govt. bonds} = €200\text{ m}$	$\text{equity} = €300\text{ m}$
$\text{total} = €1600 + 10\text{ m}$	$\text{total} = €1600 + 10\text{m}$

The liquidity position has now been adequately managed. Job done.

Endogenous money and the magic money tree

According to the 'endogenous money' view and in real life, commercial banks can create new money ex-nihilo, at will and at the decentralized level. That is, new money is being created by the bankers working in the ABC-OMRA office at the corner of the street in which you live – and not in the central bank at the centralized level. Central bankers do not have the (direct) means to control or curtail credit (= money) creation by commercial banks. Macro-economically, the 'endogenous money' view has two key implications:

1. It means that investment is – indeed – autonomous, as it can be pre-financed by bank credit (= new money), without the prior availability of savings (deposited as loanable funds in banks). The neoclassical loanable-funds market does not exist.

2. Central banks cannot directly control money supply (using the cash-reserve ratio and reserves) and use it as an instrument of monetary policy. Instead, Figure 2 applies: central banks use the interest rate as their policy instrument through which they try to affect real GDP and inflation.

Central bankers have acknowledged the endogeneity of money – accepting the practical impossibility of managing M^S. Does this mean that central banks have no ways to influence or restrict the money creation by (decentralized) commercial banks? Does the 'endogenous money' view imply that there exists a magic money tree from which commercial banks can harvest unlimited amounts of new money? The answer to these questions is: No. Commercial banks face major constraints on their ability to create money – there is no magic money tree. Let us consider what restricts money creation by commercial banks.

A first limitation arises in the form of the prudential regulation of commercial banks by the central bank. The central bank is concerned about the stability of the financial system and therefore worries about the solvency, the liquidity and risk exposure of commercial banks. To this end, the central bank is constantly monitoring the lending and borrowing activities of all commercial banks with a particular focus on the credit risks to which a bank exposes itself by its lending decisions.

Let us go back to ABC-OMRA's decision to grant Hi-Tech Unlimited a 10-year loan of €100 million. There is a risk that Hi-Tech Unlimited new project fails to generate sufficient returns and in the worst case, the firm may default on the loan. This risk is called credit risk and each and every loan carries such risk. Banks try to 'hedge' (or insure) the risk by collateralizing the loan, *i.e*. imposing a legal claim on the assets of the borrowing firm. In this case, if Hi-Tech Unlimited defaults, bank ABC-OMRA will obtain the assets (the land, the machines, the buildings) of the firm, which it can sell in order to recover its loan of € 100 million. While collateralization reduces the credit risk, some risk of default remains – after all, it could happen that the assets of the firm have no value or are non-existent.

Commercial banks have to assess the credit risks of their loans – and credit-rating agencies such as S&P, Fitch and Moody's will do the same. Central banks will monitor the credit risk exposure of ABC-OMRA (through its loan portfolio of € 1300 million) as well. If bank ABC-OMRA is found to have originated to many relatively high-risk loans, the central bank will intervene and force this bank to maintain a higher cash reserve (than 10%). Why this intervention?

Let us consider the balance sheet of bank ABC-OMRA (below) and assume that € 300 million of its loans (on the asset side) are high risk. Suppose a loan of € 100 million does actually default? What happens? ABC-OMRA has to write off € 100 million of its assets; total assets decline by € 100 million to € 1500 million. This means that liabilities have to go down as well: someone has to take the loss of € 100 million, but who?

Deposit-holders will be protected (normally) and the same will be true for other banks (which gave loans to ABC-OMRA). Shareholders will take the loss – their equity stake will decline to € 200 million. Shareholders will be upset by this, and many of them will sell their shares in bank ABC-OMRA; the stock market value of the bank will decline. Newspapers will write about the losses of the bank and deposit-holders may become worried; many bank clients will transfer money in their accounts at ABC-OMRA to other banks (deemed safer). Let us assume that deposit-holders transfer € 90 million, which means deposits and cash reserves go down by € 90 million. Deposits become € 1010 million; cash reserves fall to € 20 million, which is much below the required level of € 101 million. Bank ABC-OMRA has an immediate <u>liquidity problem</u>: it has to sell government bonds worth € 81 million to obtain the required cash; or alternatively, it has to borrow € 81 million from other banks.

Balance sheet ABC-OMRA – June 2, 2020

assets = 'active'	liabilities = 'passive'
$\text{cash reserves} = \text{€}110 - 90\text{ m}$	$\text{deposits} = \text{€}1100 - 90\text{ m}$
$\text{loans} = \text{€}1300 - 100\text{ m}$	$\text{inter-bank loans} = \text{€}200\text{ m}$
$\text{govt. bonds} = \text{€}190\text{ m}$	$\text{equity} = \text{€}300 - 100\text{ m}$
$\text{total} = \text{€}1600 - 100 - 90\text{ m}$	$\text{total} = \text{€}1600 - 100 - 90\text{ m}$

Note: ABC-OMRA is still <u>solvent</u>, because if it sells all its assets and redeems the deposit-holders and other banks, it is still left with positive equity (for its shareholders). <u>Insolvency</u> occurs if assets – deposits – inter-bank loans < 0, and shareholders have lost their stake.

Both 'solutions will create more difficulties for bank ABC-OMRA. Bond-buyers understand that bank ABC-OMRA is urgently selling bonds to obtain enough cash – and understand that they can force ABC-OMRA to sell these bonds at too low a price; if this happens, shareholders will become even more upset and exit this firm; the share price of bank ABC-OMRA will plummet. f ABC-OMRA attempts to borrow from other banks, these banks will demand a higher interest rate, because bank ABC-OMRA is a risky borrower. Credit-rating agencies will downgrade the credit-rating of this bank – and this will make it more expensive for ABC-OMRA to borrow. Shareholders will not be calmed. And so on. In the worst-case scenario, alarmed deposit-holders will start a bank-run: they will attempt to withdraw their money from ABC-OMRA, all at the same time, which is impossible.

The central bank is the lender-of-last resort, to which ABC-OMRA can turn to obtain the required cash. If the central bank announces publicly that it will support ABC-OMRA, the panic will vanish and the situation will calm down. The central bank wants to prevent this outcome at almost all costs, because financial panic and mania erodes trust in the financial system – and will not just hurt bank ABC-OMRA, but other banks as well (including healthy ones). Therefore, the central bank will monitor the lending activities of commercial banks – with a focus on credit risk exposure. If the central bank sees that a particular bank is building up excessive credit risk in its loan portfolio, the central bank will impose higher reserve requirements – forcing the bank to build a buffer (of cash) against a sudden shortage of liquidity and preventing the fire-sales of bonds and other assets (as in the example). The bottom line is that it is not in the interest of bank ABC-OMRA, nor in the interest of its shareholders and other (lending) banks, to provide unlimited credit. It is in the interest of ABC-OMRA to properly assess the creditworthiness of the borrower and the feasibility of its investment plans.

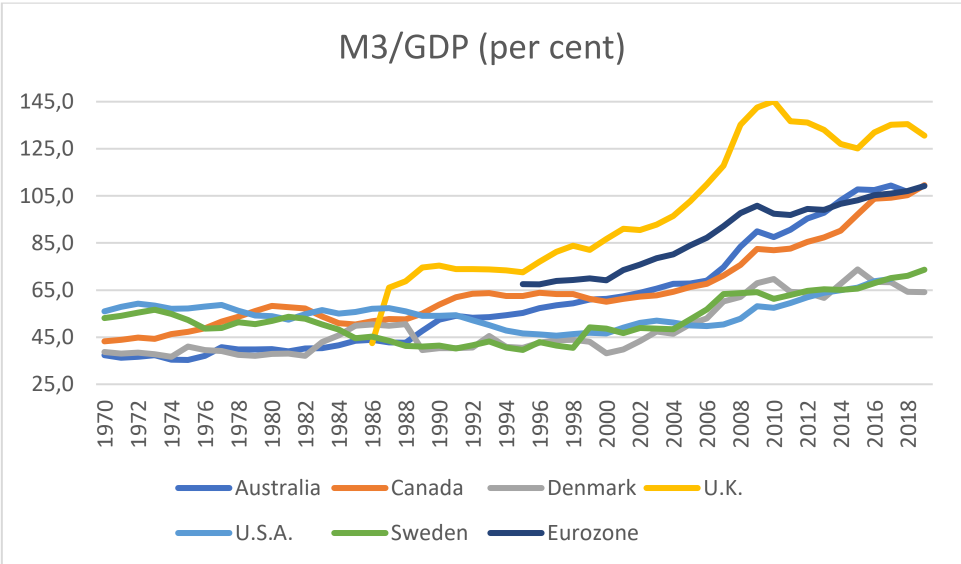
A second – related – limitation comes in the form of the control imposed on commercial bank-decision making by credit-rating agencies and the shareholders (the stock market). If the credit-risk exposure of ABC-OMRA increases, credit-rating agencies will downgrade the credit-rating of this bank; as a result, other banks will charge ABC-OMRA a higher interest rate on inter-bank loans; because ABC-OMRA has to pay a higher interest, its profits (= the difference between the interest rate it charges on lending minus the interest rate it has pay on its borrowings) will be reduced. This will affect the stock market price of ABC-OMRA. Shareholders will sound the alarm – and (in the best case) force bank managers to reduce risk exposure. (Again, the central bank may become involved.)

A third and final limitation on money creation originates from the fact that the demand for loans is low. If the economy is stagnating and the future outlook is grim, firms are not investing. The demand for bank credit is subdued – and even if banks would like to lend, they cannot force firms and households to borrow if they do not want to do so. An appropriate metaphor is: "one can lead a horse to the water, but cannot make it drink." Banks can only do so much.

One thing is clear, however, and that is that commercial banks have been creating more money (relative to GDP) in the past three decades than they were doing before. This is shown for Australia, Canada, Denmark, the Eurozone, the UK and the USA during 1970-2019 in Figure 8. For the United Kingdom, money supply was around 65% of GDP in the mid-1980s, but it increased to 135% (relative to GDP) in 2017-18. Smaller, but significant, increases in the ratio money supply to GDP occurred in the other countries. This raises the issue whence the money came and where it went. But this issue will be considered in another course:

TPM021A Economics and Finance.

Figure 8
The ratio of money supply (M3) to GDP (1970-2019)



One more thing .....

What happens to the balance sheet of bank ABC-OMRA when Hi-Tech Unlimited draws € 40 million from its account (to buy capital goods). The answer is provided in the balance sheet of ABC-OMRA (below). The balance sheet is 'in order': deposits are €1100 million and cash reserves are 10% (or €110 million). When Hi-Tech Unlimited takes out €40 million from its account, both deposits and cash reserves will go down by €40 million. This is shown in the next balance sheet.

Balance sheet ABC-OMRA – June 2, 2020

assets = 'active'	liabilities = 'passive'
$\text{cash reserves} = €110\text{ m}$	$\text{deposits} = €1100\text{ m}$
$\text{loans} = €1300\text{ m}$	$\text{inter} - \text{bank loans} = €210\text{ m}$
$\text{govt. bonds} = €200\text{ m}$	$\text{equity} = €300\text{ m}$
$\text{total} = €1610\text{ m}$	$\text{total} = €1610\text{ m}$

The money will be transported from the vaults of bank ABC-OMRA to the bank in which the capital-goods producer has its account. This is why one sees these cash carriers on the streets. (BTW: most vans are empty ……)

It should be clear that bank ABC-OMRA has to manage its liquidity position again, because it has a cash reserve of only € 70 million, but deposits of € 1060. Its required cash reserves are € 106 million (or 10% of € 1060 million). ABC-OMRA will sell bonds worth €36 million in exchange for cash. This way, it ensures that its cash reserves are at the level required by the central bank.

Balance sheet ABC-OMRA – June 2, 2020

assets = 'active'	liabilities = 'passive'
$\text{cash reserves} = €110 - 40 + 36\text{ m}$	$\text{deposits} = €1100 - 40\text{ m}$
$\text{loans} = €1300\text{ m}$	$\text{inter} - \text{bank loans} = €210\text{ m}$

govt. bonds	$= €200 - 36$ m	equity	$= €300$ m
total	$= €1610 - 40$ m	total	$= €1610 - 40$m