5 Bank liquidity & interest rate discovery

5.1 Learning outcomes

After studying this text the learner should be able to:

1. Elucidate the monetary policy models.
2. Explain the concept of quantitative easing in terms of bank liquidity.
3. Confer on the concept of bank liquidity, the balance sheet sources of change, and the underlying sources of change.
4. Describe how a central bank is able to influence bank liquidity.

5.2 Introduction

The state of bank liquidity can be measured: as the banks' net excess reserves (NER) with the central bank. It is a critical element of the successful implementation of monetary policy: controlling short-term interest rates and significantly influencing other rates.

Central banks have absolute control over NER and manipulate it to bring about a positive NER in abnormal – quantitative easing (QE) – periods in order to drive interest rates down, or a negative NER in order to have absolute control over short-term interest rates. The latter condition aims at influencing the exogenous ("from outside") force, the demand for bank credit, via the policy interest rate (PIR) and its influence on the banks' benchmark short-term lending rate, prime rate (PR), and therefore on other rates related to PR. Satisfaction of the demand for bank credit has the simultaneous outcome of deposit money creation. This text has the following sections:

- Monetary policy models.
- A bank liquidity analysis.
- Quantitative easing.
- Quantitative easing and interest rates.

5.3 Monetary policy models

There is no such thing as exogenous money; only endogenous ("from inside") money creation exists. A central bank is able to exactly control the extent of money creation, under the monetary base-focused monetary policy model (it is a theoretical model – see below), but money creation which takes place under this model is still endogenous: new bank credit extended create new bank deposits (that is, money). A demand for bank credit must exist for a bank to grant credit, which is an exogenous force.

The money stock is comprised of two parts: notes and coins (N&C) and bank deposits (BD) held by the domestic non-bank private sector (NBPS):

M = N&C + BD (held by the NBPS).

There are two monetary policy models:

- Monetary base-focused monetary policy.
- Interest rate-focused monetary policy.

The former is a theoretical model, and it rests on the money multiplier ($m = 1 / r$) [r = the reserve requirement (RR) ratio applied to bank deposits]. The growth in BD money is related to r, in that it can only increase up to the extent of excess reserves (ER) created by the central bank (CB) times m:

Money growth = ER × m
= (1 / r).

Thus, if the central bank creates ER[34] to the extent of LCC 10 billion (see Balance Sheets 5.1–5.2) by purchasing government bonds from the banks, the banks may make loans / provide credit (assume to the NBPS), which create deposits (money) simultaneously, to the extent of (see Balance Sheets 5.3–54):

Money growth = ER × (1 / r)
= LCC 10 billion × (1 / 0.1)
= LCC 100 billion.

BALANCE SHEET 5.1: BANKS (LCC BILLIONS)			
Assets		Liabilities	
Bonds Reserves (total reserves – TR) (ER = +10) (RR = 0)	-10 +10		
Total	0	Total	0

BALANCE SHEET 5.2: CENTRAL BANK (LCC BILLIONS)			
Assets		Liabilities	
Bonds	+10	Deposits: Banks (TR) (ER = +10) (RR = 0)	+10
Total	+10	Total	+10

BALANCE SHEET 5.3: BANKS (LCC BILLIONS)			
Assets		Liabilities	
Credit to private sector Reserves (TR) (ER = -10) (RR = +10)	+100 0	Deposits: Private sector (M3)	+100
Total	+100	Total	+100

BALANCE SHEET 5.4: CENTRAL BANK (LCC BILLIONS)			
Assets		Liabilities	
		Deposits: Banks (TR) (ER = -10) (RR = +10)	0
Total	0	Total	0

Note the shift from ER to RR in Balance Sheets 5.3–5.4, and the fact that the banks now exactly comply with the RR, and can lend no further. Note also that deposit money creation took place endogenously, as a result of an exogenous force: the demand for bank credit (which was assumed above).

As noted earlier, this model is a theoretical monetary policy model. It was applied briefly in the distant past, with dire consequences in terms of volatile interest rates. It was abandoned for this reason – interest rates are a significant input in business decision-making.

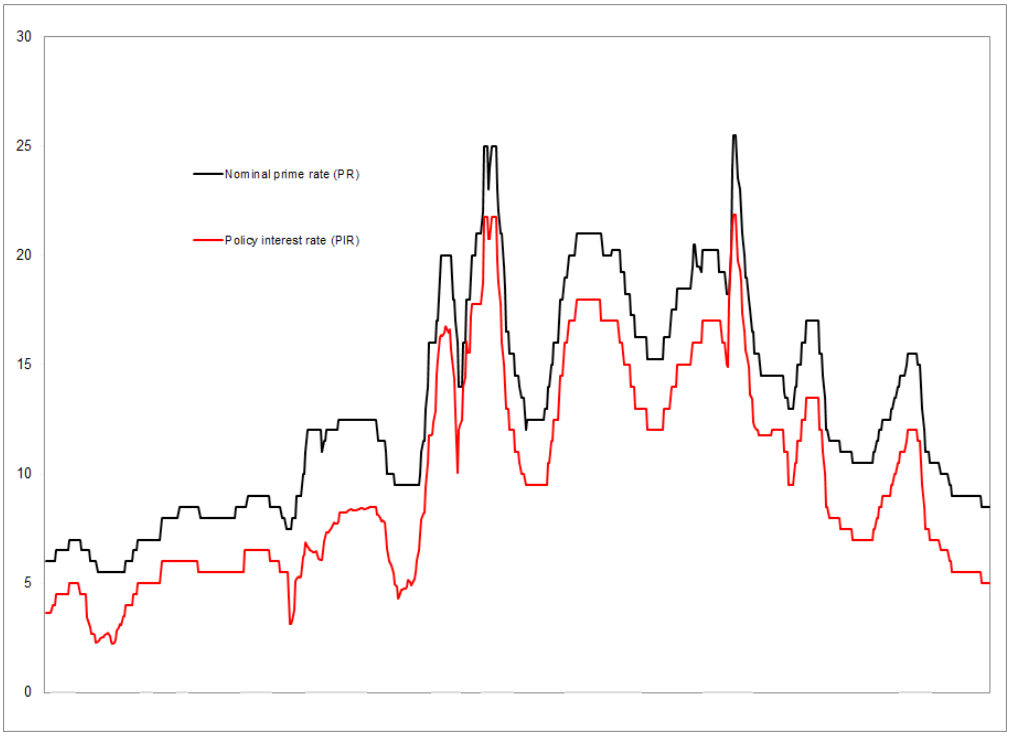

Figure 5.1: PIR & PR

The vast majority of countries adopted the *interest rate-focused monetary policy model* many decades ago. In a nutshell, it amounts to control of the banks' prime lending rate (PR) (and other lending rates which are usually benchmarked on PR), which is achieved by the creation (in normal, non-QE-policy times) of a liquidity shortage (LSh) (a.k.a. BR) in order to make the central bank's PIR effective.

An effective PIR affords the central bank control over PR and, therefore, the demand for bank credit (as discretion is exercised it is not an exact science). The control a central bank has is demonstrated in the relationship between PR and PIR for a particular country[35] for a period of over 50 years (see Figure 5.1, which we repeat for the sake of convenience; the R^2 is 0.98). This country ensures that the banks are in a BR condition at all times – to ensure that the PIR remains effective.

The reserves required by banks, as they provide credit and create deposits, are accommodated by the central bank, as part of its control over the LSh (= BR). An example of central bank accommodation (in the form of on-demand loans – BR – from the central bank, which is the case in reality in normal times) is presented in Balance Sheets 5.5–5.6 (banks provide credit of LCC 1 000 billion to the NBPS, which creates LCC 1 000 billion of new deposits; the RR ratio is 10% of deposits):

BALANCE SHEET 5.5: BANKS (LCC BILLIONS)			
Assets		Liabilities	
Credit to NBPS Reserves at CB (TR) (ER = 0) (RR = +100)	+1 000 +100	Deposits of NBPS (money) Loans from CB (BR) @ PIR	+1 000 +100
Total	+1 100	Total	+1 100

BALANCE SHEET 5.6: CENTRAL BANK (LCC BILLIONS)			
Assets		Liabilities	
Loans to banks (BR) @ PIR	+100	Bank reserves (TR) (ER = 0) (RR = +100)	+100
Total	+100	Total	+100

The central bank is accommodative, that is, supplies the BR on demand, as part of its policy to ensure that the BR condition is on-going.

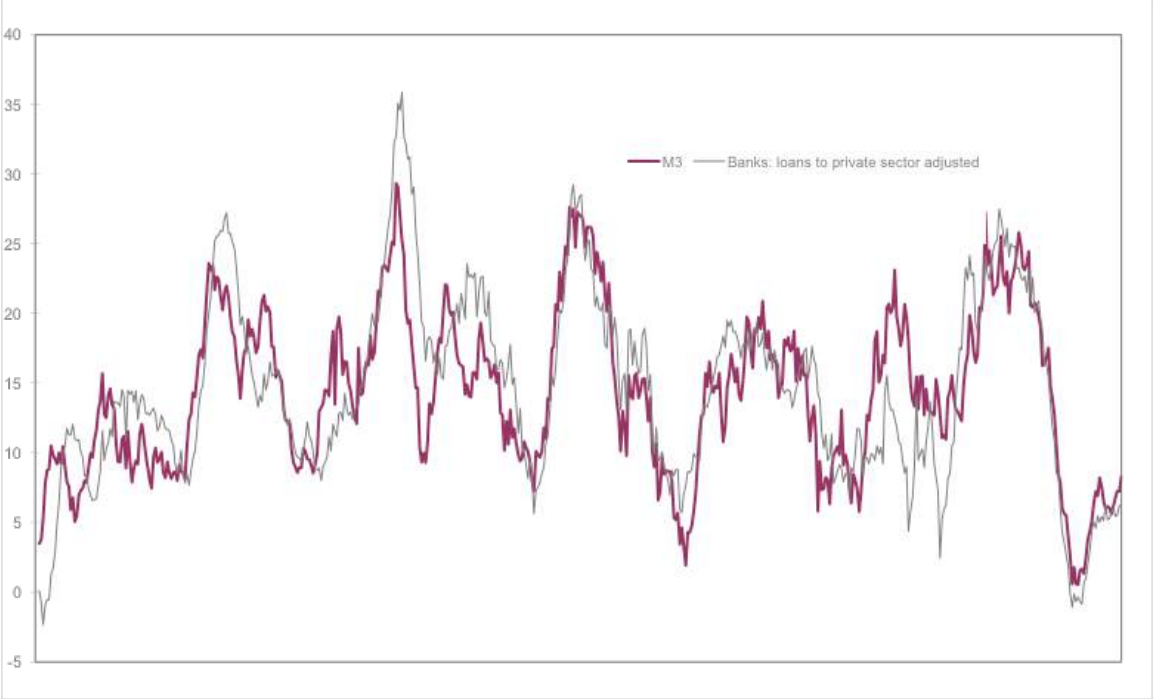

Figure 5.2: M3 and bank loans to private sector (yoy%)

The above is an example of where bank liquidity is kept "short", that is, when the banks collectively are indebted to the central bank (a BR condition exists). This policy exists (in slightly different forms in some countries) in normal times – when the money stock is increasing (the outcome of bank credit extension) and the central bank controls PR via its PIR, as indicated in Figure 5.1. Through this mechanism, it influences the exogenous force, the demand for bank credit, and therefore the growth rate in the money stock. The relationship between the growth rates in bank credit to the NBPS and M3 (for a period of over 50 years) is shown for a particular country[36] in Figure 5.2. The R^2 (0.999) (raw figures) is presented in Figure 5.3.

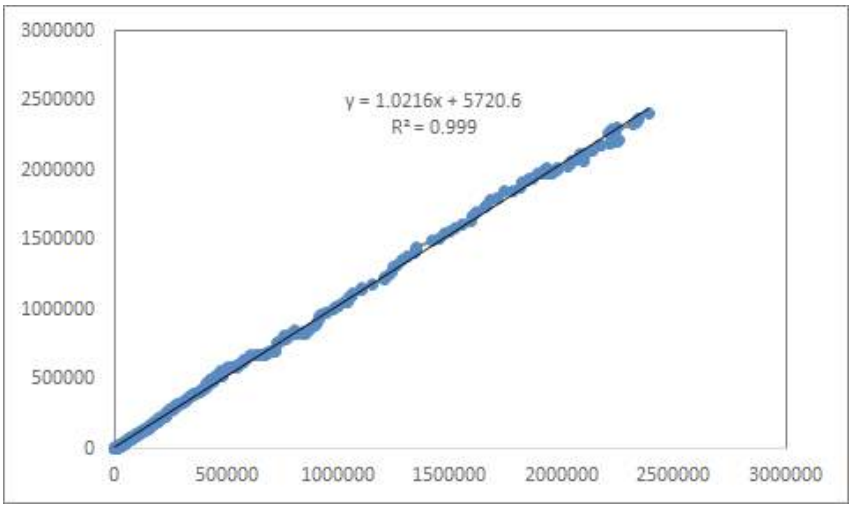

Figure 5.3: M3 and bank credit (raw monthly data)

Conditions do arise when central banks wish to drive interest rates to the lowest levels possible. These periods usually arise at the end of recessions and continue into low-growth periods, and the policy (QE) is designed to drive interest rates down to the lowest levels possible and encourage bank credit extension / money creation. We discuss this further after attention is given to the bank liquidity analysis.

5.4 A bank liquidity analysis

It should be evident that the RR is only one of many factors which influence bank liquidity. In order to elucidate, we present the simplified (we have left out unimportant items such as *other assets*, *other liabilities* and *capital and reserves*) balance sheet of the central bank in Balance Sheet 5.7.

BALANCE SHEET 5.7: CENTRAL BANK (LCC BILLIONS)			
Assets		Liabilities	
D. Foreign assets (FA) E. Credit to government (CG)[37] F. Loans to banks (BR) at PIR	1 800 2 100 100	A. Notes & coins (N&C) B. Deposits: 1. Government sector 2. Banks (TR) (a. ER = 0) (b. RR = 500) C. Loans: Foreign sector	2 000 1 000 500 500
Total	4 000	Total	4 000

From this balance sheet we can create what can be called a *bank liquidity analysis* (BLA). On the left of the identity we have the net excess reserves (NER) of the banking sector, an indicator of bank liquidity (as far as CBM is concerned). This is made up of the ER of the banking sector (item B2a) less the extent of loans to the banking sector (at the PIR), that is, the liquidity shortage (LSh = BR = item F):[4]

$$\text{NER} = \text{B2a} - \text{F}.$$

On the right hand side of the identity we have all the remaining liability and asset items:

$$\text{NER} = \text{B2a} - \text{F} = (\text{D} + \text{E}) - (\text{A} + \text{B1} + \text{B2b} + \text{C}).$$

If we group the related liability and asset items we have:

$$\text{NER} = \text{B2a} - \text{F} = (\text{D} - \text{C}) + (\text{E} - \text{B1}) - \text{A} - \text{B2b}.$$

Using the numbers in Balance Sheet 5.7, we have NER and its counterparts (in LCC billions) as follows:

$$\begin{aligned} \text{NER} &= \text{B2a} - \text{F} && = (\text{D} - \text{C}) + (\text{E} - \text{B1}) - \text{A} - \text{B2b} \\ &= 0 - 100 && = (1\,800 - 500) + (2\,100 - 1\,000) - 2\,000 - 500 \\ &= -100 && = 1\,300 + 1\,100 - 2\,000 - 500 \\ & && = -100. \end{aligned}$$

It will also be evident that from one date to another the changes (Δ) as well as the balance sheet sources of changes (BSSoC) can be calculated:

$$\Delta NER = \Delta(D - C) + \Delta(E - B1) - \Delta A - \Delta B2b.$$

Thus, a change in the NER of the banking system is *caused* by changes in the remaining balance sheet items (that is, the BSSoC):

ΔNER =	
Δ(D – C)	= net foreign assets (NFA)
+ Δ(E – B1)	= net credit to government (NCG)
– ΔA	= N&C in circulation
– ΔB2b	= required reserves (RR).

The actual sources of changes (ASoC) are the transactions that underli.e. the BSSoC. It will be evident that the instruments of open market operations (OMO) are NFA (usually forex swaps), NCG (purchases / sales of government securities in the main) and that the RR ratio (*r*) can also be used (rarely so in practice) to also manipulate bank liquidity (NER). For example, the sale of forex to a bank (a forex swap) will decrease NER [(increase the LSh (item F)]. The BSSoC is a decrease in NFA. Similarly, the sale of TBs to the banks will decrease NER (increase the LSh). The BSSoC is a decrease in NCG. Thus, the central bank has total control over bank liquidity (assuming efficient markets).

BALANCE SHEET 5.8: CENTRAL BANK (LCC BILLIONS)			
Assets		Liabilities	
D. Foreign assets (FA) E. Credit to government (CG)[38] G. Loans to banks (BR)	1 800 2 300 0	A. Notes & coins (N&C) B. Deposits: 1. Government sector 2. Banks (TR) (a. ER = 100) (b. RR = 500) C. Loans: Foreign sector	2 000 1 000 600 500
Total	4 100	Total	4 100

It will also be evident that in a recessionary period (assuming the above numbers to be in place) the central bank can change the NER condition of the banking sector at will [to a liquidity surplus (LSu) under a QE policy] by, for example, purchasing LCC 200 billion bonds from the banks (see Balance Sheet 5.8). This will result in (in LCC billions):

ΔNER		= +200 billion
BSSoC	= ΔNCG	= +200 billion.

The *outstanding* NER condition will be (in LCC billions):

NER = B2a – F
= 100 – 0
= 100.

Is this a robust analysis? Obviously, because a balance sheet balances, one can create an identity for any item. It is robust because it is based on the fact that all interbank settlement takes place over the accounts which banks are required to maintain with the central bank. For example, when the central bank sells government bonds (CG in its balance sheet) to the banks, the banks' accounts with the central bank will be debited (= a decline in TR). If the banks have no ER, they are obliged to take loans (BR = item F) from the central bank at the PIR (assuming the bond sale = LCC 100 million):

NER		= B2a – F
		= 0 – 100
		= – LCC 100 million
BSSoC	= ΔNCG	= – LCC 100 million.

The ASoC is the OMO sale.

The above demonstrates that bank liquidity (NER) is firmly under the control of the central bank. Most countries' monetary policy approach (that is, the interest rate-focused monetary policy) rests on creating and maintaining a liquidity shortage (LSh) (in normal circumstances) in order to make the PIR effective. But, as discussed earlier, in abnormal times, when a QE policy is required, the central bank is able to bring about a liquidity surplus (LSu) condition, rendering the PIR irrelevant, thus driving down interest rates to low levels.

We give attention to the influence of a QE policy on interest rates in the following section, while at the same time tackling an widespread misconception: that QE creates new money.

5.5 Quantitative easing

5.5.1 Introduction

There is a profound misconception amongst certain commentators on money and banking: that QE creates new money. The misconception is either: (1) that new money is injected into the economy; (2) newly created ER can be used by the banks to provide new credit. Neither of these is correct. QE, that is, the purchase of securities by the central bank from the banks (usually), may *lead to* money creation in the future (that is the objective of the policy), but it *does not* create money when the purchases are made. The purchases create ER for the banks, and these reserves cannot be loaned by the banks.

The only way that the excess reserves can be employed by banks is by providing new credit (underlying which lies the objective of the policy: economic activity), which creates new deposits (money), which carries a reserve requirement, thus shifting the dividing line between ER and RR in favour of the latter. This process is helped along by the immediate outcome of ER creation: the lowering of bank lending rates to a level approximating the cost of banking (the bank margin).

QE has become an almost "normal" policy for persons newly introduced to economics at the end of and following the recession of 2007–09. QE amounts to the purchase by the central bank of securities, usually government bonds, but sometimes other riskier securities, with the purpose of creating ER for the banks, and encouraging them to lower interest rates across the yield curve.

The purpose of this section is to point out the "technical" aspects of the QE policy, and its influence on interest rates. It is ordered as follows:

- Literature review.
- Does quantitative easing create money?
- Quantitative easing creates excess reserves.
- Can excess reserves be loaned out by banks?
- Concluding remarks: the money multiplier is dead.

5.5.2 Literature review

We present a literature review in Appendix 1. A summary:

- It is common in the media that reference is made to a QE policy leading to the creation of money ("pumping money into…", "printing money", "injecting money into…").
- Central banks and academics make no reference to money; only to bank reserves. This is correct.

5.5.3 Does quantitative easing create money?

We know that the money stock (M) is comprised of notes and coins (N&C) and bank deposits (BD) held by the domestic non-bank private sector (NBPS):

M = N&C + BD (held by NBPS).

We also know that the main source of change is bank credit to the NBPS. We take this further now and present what can be called a monetary analysis[39], which is an analysis of *all* the BSSoC in M.

The stock of M, as well as the BSSoC, is calculated by central banks, usually monthly, by consolidating the collective balance sheets of the private sector banks with that of the central bank (CB). It is called the consolidated balance sheet of the monetary banking sector (MBS). A simple example is presented in Balance Sheets 5.9–5.11. Note that in a consolidation interbank claims (RR, ER, BR, and N&C) are netted out.

What is the stock of money in this example? Assuming we are focused on the money stock measure M3 (total NDPS deposits), it is LCC[40] 4 600 billion:

M3 = N&C + BD
= A + B2
= 600 + 4 000
= 4 600.

BALANCE SHEET 5.9: BANKS (LCC BILLIONS)			
Assets		Liabilities	
Foreign assets (FA)	300		
Credit to government (CG)[41]	900		
Credit to private sector (CPS)[42]	2 000		
Central bank money (CBM):		Deposits: Private sector	4 000
Notes & coins (N&C)	600	Loans from central bank (BR)	200
Reserves (Total reserves – TR)	400		
(ER = 0)			
(RR = 400)			
Total	4 200	Total	4 200

BALANCE SHEET 5.10: CENTRAL BANK (LCC BILLIONS)			
Assets		Liabilities	
		Notes & coins (N&C)	1 200
Foreign assets (FA)	1 600	Deposits:	
Credit to government (G)[43]	1 000	Government sector	800
Loans to banks (BR)	200	Banks (TR)	400
		(ER = 0)	
		(RR = 400)	
		Loans: Foreign sector	400
Total	2 800	Total	2 800

BALANCE SHEET 5.11: CONSOLIDATED BALANCE SHEET OF MBS (LCC BILLIONS)			
Assets		Liabilities	
D. Foreign assets (FA)	1 900	A. Notes & coin	600
E. Credit to government (CG)	1 900	B. Deposits:	
F. Credit to private sector (CPS)	2 000	1. Government	800
		2. Private sector	4 000
		C. Loans: foreign sector	400
Total	5 800	Total	5 800

The BSSoC (= M3) are:

$$= D + E + F - (B1 + C).$$

If the related items (D and C; E and B1) are grouped, we get (LCC billions):

$$M3 = A + B2 = \underline{4\ 600}\ (600 + 4\ 000)$$

$$= (D - C) = 1\ 500\ (1\ 900 - 400)$$
$$+ (E - B1) = 1\ 100\ (1\ 900 - 800)$$
$$+ F = \underline{2\ 000}$$
$$\text{TOTAL} = \underline{4\ 600}$$

Thus, the counterparts of the M3 money stock on a particular date are:

Net foreign assets (NFA)	(D – C)
Net credit to government (NCG)	(E – B1)
Credit to private sector (CPS)	(F).

It also tells us that from a date to another date (in practice month-end to month-end) the BSSoC of changes (Δ) in M3 can be calculated as follows:

$$\Delta M3 = \Delta NFA + \Delta NCG + \Delta CPS.$$

When a QE policy is adopted and implemented, the central bank purchases securities (usually government bonds, but corporate bonds as well at times). As we know, government bonds are credit to government which are marketable, and are therefore part of CG in Balance Sheets 5.9–5.11, and of course part of NCG in the monetary analysis presented above. Corporate bonds held by the private sector banks are marketable credit to the corporate sector and are therefore part of CPS in the banks' balance sheet. Thus, it will be clear that when a central bank buys bonds from the banks they will simply shift from the banks' balance sheet to the central bank's balance sheet. The counterbalancing balance sheet items (bank reserves) will be elucidated in the following section.

The conclusion is thus that when QE is implemented and the bonds are forthcoming from the banks, there is no change in the stock of money. In practice this is overwhelmingly the case. However, to the extent that bonds are forthcoming from non-bank financial intermediaries (such as retirement funds, insurers, unit trusts, etc.), the money stock will increase, as indicated in Balance Sheets 5.12–5.14 [we assume retirement funds (i.e. private sector) sell government bonds to the central bank to the extent of LCC 100 billion] (we ignore the effect on bank reserves here in the interests of simplicity, but introduce it later).

BALANCE SHEET 5.12: RETIREMENT FUNDS (LCC BILLIONS)			
Assets		Liabilities	
Bonds Deposits at banks	-100 +100		
Total	0	Total	0

BALANCE SHEET 5.13: BANKS (LCC BILLIONS)			
Assets		Liabilities	
Reserves at CB (TR)	+100	Deposits of retirement funds	+100
Total	+100	Total	+100

BALANCE SHEET 5.14: CENTRAL BANK (LCC BILLIONS)			
Assets		Liabilities	
Credit to government (CG)	+100	Bank reserves (TR)	+100
Total	+100	Total	+100

In terms of the analysis presented above:

$$\Delta M3 = +\text{LCC 100 billion}$$
$$BSSoc = \Delta NCG = +\text{LCC 100 billion.}$$

It must be quickly pointed out that the non-bank financial intermediaries are not keen to dispose of bonds under a QE policy, because they will be aware that the prices of bonds will rise and the yield curve will move down, bringing with it large capital profits. They will be exchanging high yielding bonds for bank deposits (with almost zero rate of interest).

The QE policy not is designed for this outcome, but for the effect on bank reserves, to which we now turn.

5.5.4 Quantitative easing creates excess reserves

It is assumed that the banks are not indebted to the central bank (which is the case – obviously – under a QE policy), and that they are complying with the reserve requirement (RR). The purchase of LCC 100 billion bonds by the central bank will lead to the creation of additional ER to the extent of LCC 100 billion, as indicated in Balance Sheets 5.15–5.16.

BALANCE SHEET 5.15: BANKS (LCC BILLIONS)			
Assets		Liabilities	
Bonds (CG) Reserves at CB (TR) (ER = +100) (RR = 0)	-100 +100		
Total	0	Total	0

BALANCE SHEET 5.16: CENTRAL BANK (LCC BILLIONS)			
Assets		Liabilities	
Bonds (CG)	+100	Bank reserves (TR) (ER = +100) (RR = 0)	+100
Total	+100	Total	+100

It is sometimes mistakenly believed that banks, now having abundant ER, are in a position to loan these funds to borrowers. This is not so.

5.5.5 Can excess reserves be loaned out by banks?

This is not so because no bank is able to create or destroy central bank money (CBM, that is, bank reserves[44]). This can only be achieved through bank credit extension, which creates new deposits (money), which on which the RR is based.

Assuming the central bank creates an ER condition in the banking sector of LCC 100 billion by buying bonds (as in Balance Sheets 5.15–5.16) the banks can only reduce their ER by extending credit to the extent of LCC 1 000 billion (assuming the RR[45] ratio = 10% of deposits), that is ER × 1 / 0.1 (see Balance Sheets 5.17–5.18).

BALANCE SHEET 5.17: BANKS (LCC BILLIONS)			
Assets		Liabilities	
CPS (or CG assuming funds spent) Reserves at CB (TR) (ER = -100) (RR = +100)	+1 000 0	Deposits of the NBPS (M)	+1 000
Total	+1 000	Total	+1 000

BALANCE SHEET 5.18: CENTRAL BANK (LCC BILLIONS)			
Assets		Liabilities	
		Bank reserves (TR) (ER = -100) (RR = +100)	0
Total	0	Total	0

Note the shift in the dividing line between RR and ER in favour of the former. If we combine Balance Sheets 5.15–5.16 with 5.17–5.18, we get the entire picture: in Balance Sheets 5.19–5.20.

BALANCE SHEET 5.19: BANKS (LCC BILLIONS)			
Assets		Liabilities	
CPS (or CG assuming funds spent) Bonds (CG) Reserves at CB (TR) (ER = 0) (RR = +100)	+1 000 -100 +100	Deposits of the NBPS (money)	+1 000
Total	+1 000	Total	+1 000

BALANCE SHEET 5.20: CENTRAL BANK (LCC BILLIONS)			
Assets		Liabilities	
Bonds (CG)	+100	Bank reserves (TR) (ER = 0) (RR = +100)	+100
Total	+100	Total	+100

It will be evident that a demand for bank credit must exist for this situation to come about – and this is a function of a robust economic environment (amongst myriad other factors), a most important element of which is interest rates, specifically (in a QE policy environment) low interest rates. However, such an environment is not a panacea for growth, as it amounts, to use the common idiom, to "pushing on a string", referred to as a *liquidity trap* by Prof JM Keynes.

5.6 Quantitative easing and interest rates

A QE policy is designed to create ER for the banks, which drives interest rates down to the lowest level possible. A QE policy is accompanied with a PIR of close to 0.0% pa (in practice 0.25–0.5% pa). What does this mean? In essence, the low PIR is a central bank monetary policy message that they want interest rates to be as low as possible. The PIR is totally ineffective because the banks have ER (and – obviously – no BR). The banks are "on their own" under a QE policy: ER and an ineffective PIR.

What is the outcome of a QE policy for market interest rates? It is that deposit rates will be close to zero and bank lending rates (PR) will be approximately equal to the cost of banking, as reflected in the bank margin. PR can be no lower than this level. The YC is positively shaped under a QE policy, with the west-end reflecting the PIR / 1-day TB rate, and it "drags" down the east-end, that is, long term interest rates, by simply having made the alternative to bonds (i.e. deposit rates) most unattractive. The other major factor that impacts on the long end of the YC is of course the demand for bonds by the central banks, coupled with the lower supply of bonds, reflecting investors' propensity to hold on to their bonds for revenue / income purposes.

In essence the policy is designed to encourage borrowers to borrow from the banks (which creates new money) and the non-bank financial intermediaries, which will prompt, in time, new equity funding, and therefore higher aggregate demand and supply (GDP growth). In conclusion we present charts (Figures 5.4 and 5.5) on the relationship between bank credit (to the government and the NBPS, which is called domestic credit extension, DCE) and nominal GDP for the US and Japan (non-smoothed, raw World Bank data, 1960-2012): R^2 = 0.98 and 0.99, respectively.

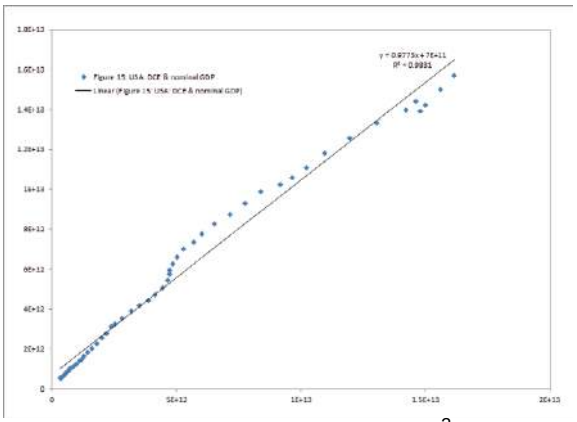

Figure 5.4: DCE & GDP_N: USA: R^2 = 0.98

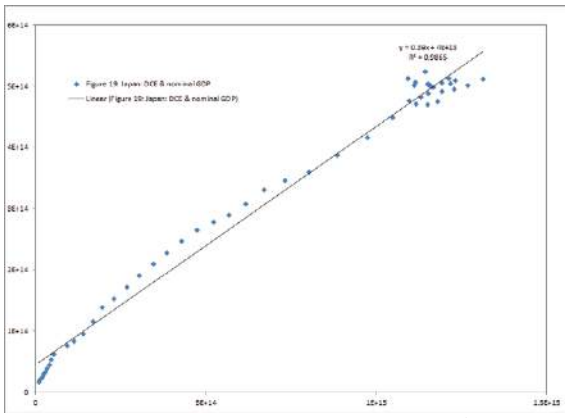

Figure 5.5: DCE & GDP_N: Japan: R^2 = 0.99

5.7 Appendix 1: quantitative easing literature review

5.7.1 Literature review: media

QE began in the US in 2008, and from there spread to other countries, including the UK and Japan, and the policy has been extended in many cases. The popular media, almost without exception, displays misinterpretation of the QE policy. Some examples follow (italics are the author's).

The New York Times (2012):

> "…central banks turn to what economists call 'quantitative easing'…methods of *pumping money into an economy* and working to lower the long-term interest rates… The most usual approach is large-scale purchases of debt. The effect is the same as *printing money in vast quantities*, but without ever turning on the printing presses. The Fed buys government or other bonds and writes down that it has done so – what is called 'expanding the balance sheet.' The bank then *makes that money available for banks to borrow, thereby expanding the amount of money sloshing around the economy* thereby, it hopes, reducing long-term interest rates."

BBC (2013):

> "Usually, central banks try to raise the amount of lending and activity in the economy indirectly, by cutting interest rates. Lower interest rates encourage people to spend, not save. But when interest rates can go no lower, a central bank's only option is to *pump money into the economy directly*. That is quantitative easing (QE). The way the central bank does this is by buying assets – usually government bonds – using money it has simply created out of thin air. The institutions selling those bonds (either commercial banks or other financial businesses such as insurance companies) will then have 'new' money in their accounts, which then boosts the money supply."

Financial Times (2013):

> "When interest rates are close to zero there is another way of affecting the price of money: Quantitative Easing (QE). The aim is still to bring down interest rates faced by companies and households and the most important step in QE is that the *central bank creates new money for use in an economy*. Only a central bank can do this because its money is accepted as payment by everybody. Sometimes dubbed incorrectly "printing money" a central bank simply *creates new money* at the stroke of a computer key, in effect increasing the credit in its own bank account. It can then use this new money to buy whatever assets it likes: government bonds, equities, houses, corporate bonds or other assets from banks."

US News (2013):

> "…quantitative easing, a process in which the government purchases assets from banks and private companies in order to *add a set amount of money into the economy.*"

Wikipedia (2013):

> "Quantitative easing (QE) is an unconventional monetary policy used by central banks to stimulate the national economy when standard monetary policy has become ineffective. A central bank implements quantitative easing by buying financial assets from commercial banks and other private institutions, thus *creating money and injecting a pre-determined quantity of money into the economy*."

Independent.ie (2013):

> "Massive quantitative easing by central banks around the world *has created huge amounts of new money in the economy.* Much of that cash is being pushed into equity markets, helping push up valuations despite doubts about the underlying health of the global economy."

5.7.2 Literature review: academia and central banks

On the other hand, academics and central banks (which implement QE policy) obviously comprehend the policy, its channels of transmission, its possible outcomes, its shortcomings, etc. As said earlier, this text focuses on the technical aspects of QE. As such, the following extracts from academic and central bank papers are selected for their expositions on the first effect of QE: on bank reserves) (italics are the author's).

Federal Reserve Board of Governors (Bernanke, BS, 2009):

> "Our approach – which could be described as 'credit easing'- resembles quantitative easing in one respect: It involves an expansion of the central bank's balance sheet. However, in a pure QE regime, the focus of policy is the *quantity of bank reserves*, which are liabilities of the central bank; the composition of loans and securities on the asset side of the central bank's balance sheet is incidental."

Bank of England (Benford et al., 2009):

> "…the Monetary Policy Committee (MPC) decided to reduce Bank Rate to 0.5% and to undertake what is sometimes called 'quantitative easing'. This meant that it began purchasing public and private sector assets using *central bank money*."

Bank of Japan (Shiratsuka, 2010):

> "The BOJ provided ample *excess reserves* by using various tools for money market operations, including an increase in the outright purchase of long-term government bonds."

Bank of England (Joyce et al., 2010):

> "…the Committee also announced that…it would ease monetary conditions further through a programme of asset purchases funded by the issuance of *central bank reserves*."

Blinder, AS (2010):

> "The most obvious approach is to buy one of the risky and / or less-liquid assets, paying either by (i)…or (ii) creating *new base money*, which would increase the size of its balance sheet."

Krishnamurthy and Vissing-Jorgensen (2011):

> "The QE strategy involves purchasing long-term securities and paying by increasing *reserve balances*."

5.8 References

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