

International Money and Banking:

4. Central Banks

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Money Creation in Modern Economies

- In advanced economies these days, money creation no longer takes the form of governments directly issuing coins or notes.
- Instead, starting with the Bank of England in 1844, the convention has become that the body with a monopoly power over the creation of money is a public institution known as a central bank.
- Central banks started life as the clearinghouses that we discussed before. Banks all kept accounts at the “central bank” and they used these accounts to settle payments with other banks.
- Today, all banks *must* keep what are known as “reserve” accounts with their central bank and there are rules requiring banks to keep a certain amount of funds in these reserve account (“reserve requirements”). It is through adjustments to these accounts that money is created in modern economies.
- Though they operate separately from government finance or treasury departments, central banks are public bodies and they generally return the profits from their operations to the fiscal authorities.
- Governments also keep their own account at the central bank, depositing tax revenue and paying their bills from this account.

Example: The Eurosystem's Reserve Requirements

- Let's take a look in detail at one example of how reserve requirements operate.
- All banks in the Eurosystem (i.e. those countries that use the euro) must satisfy reserve requirements according to the following rules:
 - ▶ Banks can make use of averaging provisions, so reserve requirements are determined as an average of the end-of-day balances on their reserve accounts over a defined “maintenance period”.
 - ▶ Required reserves usually equal 2 percent of a defined “reserve base.” In January 2012, this was lowered to 1 percent.
 - ▶ Balance sheet data for the end of a given month are used to determine the reserve base for the maintenance period starting in the calendar month two months later.
 - ▶ The reserve base is defined as overnight deposits, deposits with agreed maturity or period of notice up to 2 years, debt securities issued with maturity up to 2 years and money market paper.
 - ▶ Liabilities owed to other Eurosystem banks can be excluded from the reserve base.

Money Creation via Open Market Operations

- Where does the cash in your pocket come from? Milton Friedman used a “helicopter drop” of cash as a simple analogy for central bank money creation.
- Since helicopter drops are not practical or fair, in practice, central banks create money via methods such as *open market operations*:
 - 1 The central bank purchases a security (e.g. a bond) by writing a cheque.
 - 2 The former security-holder then deposits the cheque at her bank, call it XYZ Bank.
 - 3 When XYZ Bank presents the cheque for payment to the central bank, the central bank credits XYZ Bank’s reserve account by the amount paid for the security.
 - 4 XYZ Bank can, if they wish, swap these additional reserves for cash to put in ATM machines. When XYZ Bank orders a delivery of cash from the central bank, its reserve account is reduced by that amount.
- Where does the central bank get the money from to increase XYZ Bank’s reserve account? Nowhere! This is the central bank “creating” money.
- Note that the actual printing of cash in this example is driven by the demand from bank customers via removing money from ATM machines.

Money Creation via Loans to Banks

- Open market operations via bond purchases have been the key tool for money creation used in recent years by some of the world's most important central banks.
- Another way to create money is for a central bank to make loans to banks.
- For example the Eurosystem of central banks provides a large quantity of loans to the Euro-area banks at a specified rate. The rate of interest on these loans is its key policy rate. I will provide a lot more information on these lending operations later.
- As a condition for obtaining such loans, banks must pledge some assets to the ECB as **collateral**. This means that if the bank fails to repay the ECB, the central bank will take the collateral in lieu of repayment of the loan.
- As with open market operations, central banks provide loans to banks by crediting their reserve accounts, creating money from nowhere.

Money Creation via Loans to Governments

- Central banks can also create money by directly providing it to their governments just like the old medieval mints. However, this kind of direct relationship is now rarely seen.
- A less direct form of “monetary financing” is for central banks to purchase bonds from the government. If the central bank retires the money created to purchase the bond, then the cost of financing a deficit has just been delayed. If the central bank is willing to “roll over” these bonds on maturity (i.e. purchase a new bond when the old bond falls due) then the cost is permanently delayed.
- Due to concerns about fiscal deficits leading to excess money creation, many central banks, including the Fed and the ECB, are now banned from directly purchasing bonds from governments. However, both the Fed and ECB can purchase bonds *indirectly* by acquiring them via open market operations.
- These indirect purchases can make it easier for a government run deficits by selling bonds — investors can buy government bonds at primary auctions knowing that the central bank will be willing to buy them afterwards. And if the central bank is willing to roll over these bonds at maturity, it would be very similar to direct monetary financing.

Goodhart's Warnings About the Euro

- In the 1998 paper we discussed in the first lecture, Goodhart warned about potential problems with European monetary union due to the planned separation of fiscal and monetary policy.
- *“Historically, the nation states have been able, in extremis, (whether in the course of war or other—often self-induced—crisis) to call upon the assistance of the money-creating institutions, whether the mint via debasement of the currency, a Treasury printing press, or the Central Bank. Whenever states (as in USA or Australia), provinces (as in Canada), cantons, lander etc. have joined together in a larger federal unity, both the main political, the main fiscal and the monetary powers and competencies have similarly emigrated to the federal level. The Euro area will not be like that.”*
- *“In particular, the participating nations will continue to have the main fiscal responsibilities; but in the monetary field, their status will have changed to a subsidiary level, in the sense that they can no longer, at a pinch, call upon the monetary authority to create money to finance their national debt. There is to be an unprecedented divorce between the main monetary and fiscal authorities.”*
- This had indeed been a major issue during the euro crisis of recent years.

Example: Money Creation via Quantitative Easing

- In recent years, the Federal Reserve, the Bank of England and (since early 2015) the ECB have engaged in programmes of large-scale asset purchases, known as Quantitative Easing (QE).
- We will discuss the rationale for these programmes later. For now, it's useful just to see how this kind of money creation works.
- The chart on the next page shows changes over time in the assets owned by the Federal Reserve.
- It shows big increases in late 2008 and early 2009 due to large amounts of lending to banks (the yellow area) and special programmes to provide credit to financial markets (the blue area). The special credit market programmes have been wound down since and lending to banks has been greatly reduced.
- Since 2009, the big expansion in the Fed's asset holdings has been due to purchases of government bonds and government-guaranteed mortgage-backed securities (the green area).
- The chart on the page afterwards shows how the Fed has paid for these purchases. There has been a big increase in the amount held in reserve accounts (denoted here "deposits of depository institutions").

How the Fed Created Money via QE

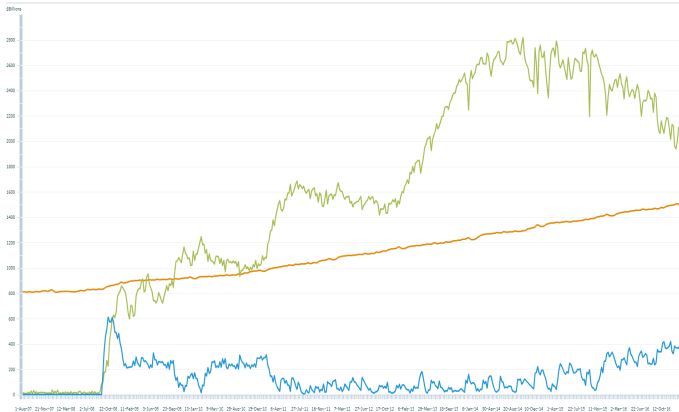
Close view of the 5 charts.

Selected Liabilities of the Federal Reserve

- Currency in Circulation
- Deposits of Depository Institutions
- Treasury Balance

View as Table
Fullscreen

On the liabilities side of the Federal Reserve's balance sheet, the amount of currency outstanding has continued to rise gradually, but reserve balances (deposits of depository institutions) have increased dramatically relative to prior to the financial crisis.



Some Quantitative Easing Myths

There have been many many news and opinion articles about quantitative easing and a high fraction of them have included inaccurate statements.

- 1 Many commentators say that the QE programme involves “printing money.” The graph on the previous page shows that this has not been the case. There have been large increases in the size of the reserve accounts that banks have with the Fed but actual printed currency has risen modestly in line with historical trends.
- 2 Some argue that the Federal Reserve’s purchases of Treasury bonds has allowed the U.S. government to run larger deficits. However, the Fed has simply purchased existing Treasury bonds from private investors. It has not changed the total stock of government debt and so has not allowed the government to run larger deficits.
- 3 If the Fed planned to continually “roll over” its Treasury bonds — buying new government bonds when its existing ones mature — then QE could be considered monetary financing. However, the Fed plans to gradually sell its bonds back to the private sector, so this is not the current plan.

Central Bank Balance Sheets

- Due to their money creating activities, central banks build up large stocks of assets over time.
- Depending on how much of the revenue stream from these assets has been passed over to governments over time, the current value of a central bank's assets may exceed the amount of money they have created in the past when acquiring these assets.
- Central banks release a “balance sheet” to summarise the assets they own and the money they have issued.
- In a stylised example, such as the one below, assets are shown on the left-hand side while the right-hand side lists the amount of money that has been created as “Liabilities”. The difference between the current value of assets and liabilities is labelled “Capital”.

Assets	Liabilities and Capital
Securities	Money Created
Loans	Capital

The Eurosystem's Balance Sheet

The ECB reports the combined consolidated balance sheet of the ECB and all the national central banks in the Eurozone each week. Here's what it looks like

1.1 Consolidated financial statement of the Eurosystem

(EUR millions)

I. Assets

	30 December 2016	6 January 2017	13 January 2017	20 January 2017	27 January 2017
Gold and gold receivables	382,061	382,062	382,062	382,061	382,061
Claims on non-euro area residents in foreign currency	327,854	326,551	326,902	325,717	323,628
Claims on euro area residents in foreign currency	30,719	31,894	34,718	31,353	35,781
Claims on non-euro area residents in euro	19,082	18,470	17,518	18,981	18,805
Lending to euro area credit institutions in euro	595,873	590,825	599,085	588,996	588,671
Main refinancing operations	39,131	34,006	32,319	32,330	33,994
Longer-term refinancing operations	556,570	556,570	556,570	556,570	554,494
Fine-tuning reverse operations	0	0	0	0	0
Structural reverse operations	0	0	0	0	0
Marginal lending facility	172	249	175	96	183
Credits related to margin calls	0	0	0	0	0
Other claims on euro area credit institutions in euro	69,104	70,918	74,838	78,138	80,421
Securities of euro area residents in euro	1,974,899	1,986,976	2,010,352	2,030,431	2,049,756
Securities held for monetary policy purposes	1,654,026	1,666,075	1,690,230	1,710,899	1,730,309
Other securities	320,873	320,901	320,122	319,531	319,447
General government debt in euro	26,460	26,460	26,460	26,460	26,460
Other assets	236,847	238,482	235,387	237,486	235,183
Total assets	3,662,901	3,672,638	3,697,302	3,719,624	3,740,766

2. Liabilities

	30 December 2016	6 January 2017	13 January 2017	20 January 2017	27 January 2017
Banknotes in circulation	1,126,216	1,122,223	1,115,472	1,110,749	1,109,033
Liabilities to euro area credit institutions in euro	1,313,264	1,369,150	1,396,795	1,386,798	1,385,659
Current accounts (covering the minimum reserve system)	888,988	928,578	935,308	952,359	978,887
Deposit facility	424,208	440,534	461,388	434,268	406,739
Fixed-term deposits	0	0	0	0	0
Fine-tuning reverse operations	0	0	0	0	0
Deposits related to margin calls	69	38	99	171	33
Other liabilities to euro area credit institutions in euro	9,427	8,864	9,590	9,670	7,661
Debt certificates issued	0	0	0	0	0
Liabilities to other euro area residents in euro	220,760	213,812	240,228	281,767	305,200
Liabilities to non-euro area residents in euro	205,678	167,363	138,636	133,805	132,994
Liabilities to euro area residents in foreign currency	3,644	5,702	7,735	7,305	9,221
Liabilities to non-euro area residents in foreign currency	9,301	10,701	13,410	9,665	10,524
Counterpart of special drawing rights allocated by the IMF	59,263	59,263	59,263	59,263	59,263
Other liabilities	221,402	221,311	221,947	226,374	226,985
Revaluation accounts	394,418	394,418	394,418	394,418	394,418
Capital and reserves	99,527	99,811	99,808	99,808	99,808
Total liabilities	3,662,901	3,672,638	3,697,302	3,719,624	3,740,766

Do Central Banks Need To Be “Solvent”?

- It is natural to look at any balance sheet in which one side is labelled “Assets” and assume that most of what’s on the other side is “Liabilities”.
- Central bank balance sheets list the money they have created as “Liabilities.” But you need to be careful interpreting these balance sheets.
- When a central bank operates a non-fiat currency, it agrees to have sufficient “hard assets” of a particular type so that it can swap its currency for the hard assets at the agreed conversion rate.
- In contrast, in a fiat currency system, there is no promise to redeem notes for any particular amount of gold or other assets. These “liabilities” are essentially notional.
- In a fiat currency system, a central bank’s asset holdings could fall below the value of the money it has issued (i.e. the balance sheet could show it to be “insolvent”) without affecting the value of the currency in circulation. A fiat currency’s value—its real purchasing power—is determined by how much money has been supplied and the various factors influencing money demand, not by the stock of central bank assets.
- See my blog post “Is the ECB Risking Insolvency? Does it Matter?”

A Possible Exception? Interest on Reserves

- Some recent discussions of central bank balance sheets have emphasised a possible problem that could occur if a central bank's assets fell below the liabilities listed on its balance sheet.
- These balance sheets look like this:

Assets	Liabilities and Capital
Securities	Currency
Loans	Reserves
	Capital

- While currency liabilities don't cost central banks anything, many central banks now pay interest on reserve accounts to banks. As we will discuss later, this interest rate can be an important influence on private market interest rates.
- If a central bank's assets didn't provide it with sufficient money to cover these interest payments, then the central bank could have to create additional money to be able to pay this interest. This additional money creation could raise the rate of inflation.

A Real Problem?

In my opinion, the potential problem just noted is unlikely to ever matter for any of the world's leading central banks.

- ① We will discuss later how central banks control short-term interest rates. For now though, I will note that it is possible for them to do this without paying interest on reserves. The Fed only began paying interest on reserves in 2008 and had little difficulty controlling interest rates prior to the introduction of this policy.
- ② Currency still constitutes an important element of “liabilities” even at central banks like the Fed that have hugely increased reserves. So assets would have to fall very far short of total notional liabilities to be unable to provide the funds to cover interest on reserves.
- ③ As we will discuss later, modern central banks control inflation by setting interest rates rather than by supply a certain quantity of money. Even if a central bank had to increase the supply of reserves to pay a higher interest rate on reserves to banks, this higher interest rate would reduce inflation (rather than the additional money supplied increasing it.)

Reasons for Risk Control at Central Banks

- So it's not important that a central bank's balance sheet show that its assets exceed liabilities. But that doesn't mean central banks don't have to care about the assets they acquire. When a central bank creates money, there are two types of cost to the public that have to be kept in mind.
- **Opportunity Cost:** Instead of acquiring a particular asset, the money could have been distributed to the public via a helicopter drop or providing each person with a fixed amount of money. In this sense, if a central bank pays too much to acquire an asset, then the person selling to the central bank obtains a windfall profit with money that could have been used to benefit the public.
- More realistically, because central banks are public institutions, they distribute profits to governments. So poor returns on central bank assets effectively cost the state money.
- **Indirect Cost:** Because expansions in the supply of money can produce inflation, printing money can create an indirect cost by making goods and services more expensive.
- For these reasons, it is important that central banks have proper risk control procedures aimed at securing a fair return on the assets acquired via money creation.

Other Functions of Central Banks: Financial Stability

- Because central banks have essentially unlimited power for creating money, they have historically become involved in supplying loans to banks that run into serious problems.
- There are many controversies over this **Lender of Last Resort** role, which we will discuss later in greater detail.
- Given their lender of last resort role, central banks are often given explicit mandates to maintain the stability of the financial system.
- Central banks are also often involved in designing and enforcing financial regulation as well as day to day supervision of financial institutions (i.e. checking on their safety and compliance with regulations).
- There have been debates over the years about whether central banks should be involved in directly supervising banks. I am strongly in favour of them having this role. See my paper “Should Monetary Policy be Separated From Banking Supervision?”
- In the euro area, the ECB took over as the single supervisory mechanism (SSM) for all banks in 2015.

Other Functions of Central Banks: Payments Systems

- Because all banks maintain reserve accounts with their central bank, this puts the central banks at the very centre of the banking system.
- This gives them an advantage over all other institutions in facilitating payments between banks: If Bank A wants to send money to Bank B, the easiest way to do this is for Bank A to ask the central bank to deduct from its reserve account and to add money to Bank B's reserve account.
- Central banks have developed complex payments systems, based on sophisticated IT platforms, to make these transfers between banks with minimal delays.
 - ▶ In 2015, the Fed's *Fedwire* system handled close to 600,000 transfers per day with an average total daily value of \$3.3 trillion (i.e. \$3,300,000 millions).
 - ▶ In 2014, the Euro area's *TARGET2* system processed a daily average of 343,729 transfers, with an average total value of €1.835 trillion.
- These systems ensure that your cheques don't bounce and that your credit or debit cards are accepted for payment. Keeping these systems working well is an important, if unglamorous, part of central banking.

Recap: Key Points from Part 4

Things you need to understand from these notes:

- 1 What are reserve accounts and reserve requirements.
- 2 Details of the Eurosystem's reserve requirements.
- 3 How central banks create money via open market operations or loans to banks.
- 4 Monetary financing and Goodhart's warning about the euro.
- 5 How the Fed's Quantitative Easing programme worked.
- 6 How to describe a central bank's balance sheet.
- 7 Do central banks need to have assets exceeding liabilities?
- 8 Implications of paying interest on reserves for central banks.
- 9 Reasons for risk control in managing central bank assets.
- 10 Why central banks play an important role in payments systems.
- 11 Why central banks are usually given a mandate to maintain financial stability.