International Money and Banking:
4. Central Banks

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Spring 2020
Introducing Central Banks

- In modern advanced economies, 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.
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) worth $1000 from Janet by giving her a cheque for $1000.
2. Janet then deposits the cheque at her bank, call it OmoBank.
3. When OmoBank presents the cheque for payment to the central bank, the central bank credits OmoBank’s reserve account by $1000.
4. OmoBank can, if they wish, swap these additional reserves for cash to put in ATM machines. When OmoBank 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 OmoBank’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.
A Recent Student’s Graph of the Open Market Operation Process

Central Banks

Money Creation via Open Market Operations

- Central Bank
- Reserve Account
- Equity

1. $1000 Cheque
2. $1000 Bond
3. $1000 Deposit
4. $1000 Reserve Account

- Omep Bank
- Omep Deposit
- Omep Cheque

- Mrs. Jones

Provided that: the $1000 asset earns more than the interest paid to Omep Bank.

Then: the central bank will have an addition profit.

Ps. Reserve account usually turns into cash (which does not have any interest), central bank generally have a large amount of profit.
Fiscal Implications of Open Market Operations

- Note that when the Fed created money via the open market operation, Janet was not better off: Janet sold a bond worth $1000 and received a credit to their deposit account worth $1000.

- OmoBank are not better off. They have increased assets of $1000 in the form of additional money in a reserve account with the central bank but they also have an additional liability in the form of an $1000 in deposits owed to Janet.

- How about the central bank? The central bank has a new asset worth $1000 while it has an additional $1000 in reserves that are owned by OmoBank. Provided the new asset earns more interest than the central bank pays to OmoBank, then the central bank will have an additional flow of profits and will be able to transfer some of these profits back to central government.

- In practice, central bank assets generally earn more than central banks pay out to banks in the form of interest payments on reserves. And since reserves are often turned into currency (which does not earn any interest) central banks generally make large amounts of profit.

- As we will discuss in more detail later, countries with weak tax collection authorities might decide to exploit the profits generated by central banks by doing large amounts of open market operations.
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 has traditionally been the ECB’s 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.
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”.

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities and Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Securities</td>
<td>Money Created</td>
</tr>
<tr>
<td>Loans</td>
<td>Capital</td>
</tr>
</tbody>
</table>
The Eurosystem’s Balance Sheet: Assets

The ECB reports the combined consolidated balance sheet of the ECB and all the national central banks each week. Here’s a balance sheet from June 2019.

<table>
<thead>
<tr>
<th>Assets (EUR millions)</th>
<th>Balance</th>
<th>Difference compared with last week due to transactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Gold and gold receivables</td>
<td>402,094</td>
<td>-1</td>
</tr>
<tr>
<td>2 Claims on non-euro area residents denominated in foreign currency</td>
<td>344,789</td>
<td>-50</td>
</tr>
<tr>
<td>2.1 Receivables from the IMF</td>
<td>80,599</td>
<td>-24</td>
</tr>
<tr>
<td>2.2 Balances with banks and security investments, external loans and other external assets</td>
<td>264,191</td>
<td>-25</td>
</tr>
<tr>
<td>3 Claims on euro area residents denominated in foreign currency</td>
<td>20,075</td>
<td>881</td>
</tr>
<tr>
<td>4 Claims on non-euro area residents denominated in euro</td>
<td>23,655</td>
<td>5,342</td>
</tr>
<tr>
<td>4.1 Balances with banks, security investments and loans</td>
<td>23,655</td>
<td>5,342</td>
</tr>
<tr>
<td>4.2 Claims arising from the credit facility under ERM II</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5 Lending to euro area credit institutions related to monetary policy operations denominated in euro</td>
<td>723,958</td>
<td>-973</td>
</tr>
<tr>
<td>5.1 Main refinancing operations</td>
<td>5,276</td>
<td>-852</td>
</tr>
<tr>
<td>5.2 Longer-term refinancing operations</td>
<td>718,682</td>
<td>0</td>
</tr>
<tr>
<td>5.3 Fine-tuning reverse operations</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5.4 Structural reverse operations</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5.5 Marginal lending facility</td>
<td>0</td>
<td>-120</td>
</tr>
<tr>
<td>5.6 Credits related to margin calls</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6 Other claims on euro area credit institutions denominated in euro</td>
<td>36,004</td>
<td>-1,558</td>
</tr>
<tr>
<td>7 Securities of euro area residents denominated in euro</td>
<td>2,859,529</td>
<td>998</td>
</tr>
<tr>
<td>7.1 Securities held for monetary policy purposes</td>
<td>2,829,978</td>
<td>1,121</td>
</tr>
<tr>
<td>7.2 Other securities</td>
<td>229,551</td>
<td>-122</td>
</tr>
<tr>
<td>8 General government debt denominated in euro</td>
<td>23,910</td>
<td>0</td>
</tr>
<tr>
<td>9 Other assets</td>
<td>256,426</td>
<td>-160</td>
</tr>
<tr>
<td>Total assets</td>
<td>4,690,441</td>
<td>4,480</td>
</tr>
</tbody>
</table>
The Eurosystem’s Balance Sheet: Liabilities

The ECB reports the combined consolidated balance sheet of the ECB and all the national central banks each week. Here’s a balance sheet from June 2019.

<table>
<thead>
<tr>
<th>Liabilities (EUR millions)</th>
<th>Balance</th>
<th>Difference compared with last week due to transactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Banknotes in circulation</td>
<td>1,334,079</td>
<td>2,911</td>
</tr>
<tr>
<td>2 Liabilities to euro area credit institutions related to monetary policy operations denominated in euro</td>
<td>2,643,521</td>
<td>28,092</td>
</tr>
<tr>
<td>2.1 Current accounts (covering the minimum reserve system)</td>
<td>1,441,147</td>
<td>52,602</td>
</tr>
<tr>
<td>2.2 Deposit facility</td>
<td>602,365</td>
<td>-23,618</td>
</tr>
<tr>
<td>2.3 Fixed-term deposits</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2.4 Fine-tuning reverse operations</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2.5 Deposits related to margin calls</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3 Other liabilities to euro area credit institutions denominated in euro</td>
<td>8,390</td>
<td>2,244</td>
</tr>
<tr>
<td>4 Debt certificates issued</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5 Liabilities to other euro area residents denominated in euro</td>
<td>337,076</td>
<td>-27,818</td>
</tr>
<tr>
<td>5.1 General government</td>
<td>210,205</td>
<td>-29,264</td>
</tr>
<tr>
<td>5.2 Other liabilities</td>
<td>126,871</td>
<td>1,647</td>
</tr>
<tr>
<td>6 Liabilities to non-euro area residents denominated in euro</td>
<td>235,080</td>
<td>262</td>
</tr>
<tr>
<td>7 Liabilities to euro area residents denominated in foreign currency</td>
<td>7,160</td>
<td>622</td>
</tr>
<tr>
<td>8 Liabilities to non-euro area residents denominated in foreign currency</td>
<td>11,845</td>
<td>136</td>
</tr>
<tr>
<td>8.1 Deposits, balances and other liabilities</td>
<td>11,845</td>
<td>136</td>
</tr>
<tr>
<td>8.2 Liabilities arising from the credit facility under ERM II</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9 Counterpart of special drawing rights allocated by the IMF</td>
<td>57,459</td>
<td>0</td>
</tr>
<tr>
<td>10 Other liabilities</td>
<td>251,201</td>
<td>-3,070</td>
</tr>
<tr>
<td>11 Revaluation accounts</td>
<td>397,340</td>
<td>0</td>
</tr>
<tr>
<td>12 Capital and reserves</td>
<td>107,200</td>
<td>0</td>
</tr>
<tr>
<td>Total liabilities</td>
<td>4,690,441</td>
<td>4,480</td>
</tr>
</tbody>
</table>

Totals/sub-totals may not add up, due to rounding.
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:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities and Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Securities</td>
<td>Currency</td>
</tr>
<tr>
<td>Loans</td>
<td>Reserves</td>
</tr>
<tr>
<td></td>
<td>Capital</td>
</tr>
</tbody>
</table>

- 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 probably 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.

1. **Opportunity Cost**: Instead of acquiring a particular asset, the money could have been used to buy an asset which gave the central bank a return and this return could have been passed back to central government. 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.

2. **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.
Example: Money Creation via Quantitative Easing

- Over the past decade, the Federal Reserve, the Bank of England and the Eurosystem engaged in programmes of large-scale asset purchases, known as Quantitative Easing (QE). Forget the fancy name for now, these were just very large and sustained programmes of open market operations.

- The charts on the next page shows changes over time in the assets owned by the Federal Reserve and Eurosystem and how they acquired these assets.

- Note the big increase in the Fed’s assets from 2010-2015 as it purchased government bonds (the brown area) and government-guaranteed mortgage-backed securities (the purple area). In 2018, the Fed began selling its bond holdings and its total assets have shrunk.

- Similarly, we can see the ECB’s QE programme with the big increase in security holdings from 2015-2018.

- The chart on the page afterwards shows how they paid for these purchases. There was a huge increase in the amount held in reserve accounts (denoted as “deposits of depository institutions” in the Fed chart and “liabilities to Euro Area credit institutions” on the ECB chart).
The Fed’s Assets

- Federal Agency Debt and Mortgage-Backed Securities Purchases
- Lending To Financial Institutions
- Long Term Treasury Purchases
- Providing Liquidity To Key Credit Markets
- Traditional Security Holdings

Millions of dollars

2008 2010 2012 2014 2016 2018

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How the Fed Created Money via QE

![Graph showing changes in currency in circulation, deposits of depository institutions, and Treasury balance over time.](graph.png)

- **Currency in Circulation (in millions of dollars)**
- **Deposits of Depository Institutions (in millions of dollars)**
- **Treasury Balance (in millions of dollars)**
How the Eurosystem Created Money via QE
Some Quantitative Easing Confusions

These QE programmes have generated a lot of commentary of varying quality. These often included inaccurate statements.

1. QE was sometimes described as “printing money” but printed currency only trended up slowly during the QE episodes. The central banks paid for the bond purchases by crediting reserve accounts.

2. Some argued that central bank purchases of government bonds allowed governments to run larger deficits. However, these programmes saw existing government bonds from private investors. They did not change the total stock of government debt and so it did not allow governments to run larger deficits.

3. If the central banks planned to continually “roll over” its Treasury bonds — buying new government bonds when its existing ones matured — then QE could have been considered monetary financing. But the plan in each case was always to gradually sell its bonds back to the private sector. That said, the Fed has now ceased its programme of selling bonds while still retaining a large amount of those purchased, so perhaps there is now (ex post) a justification that some of the fiscal debt has been “monetised”.

Karl Whelan (UCD)

Central Banks

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Other Functions of Central Banks: Financial Stability

Central banks can create money “with the push of a button” and supply it a bank by crediting its reserve account. For this reason, central banks have historically become involved in supplying loans to banks that run into serious problems. Central banks can usually provide money quicker (and with more secrecy) than can central government treasuries.

There are many controversies over this Lender of Last Resort role, which we will discuss in detail later.

Partly because of 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. See my paper “Should Monetary Policy be Separated From Banking Supervision?” for a discussion of these issues.

In the euro area, the ECB took over as the single supervisory mechanism (SSM) for all banks in 2015.
Functions of Central Banks: Payments & Settlement

- 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 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 and settlement systems, based on sophisticated IT platforms, to make these transfers between banks with minimal delays.
  - In 2018, the Fed’s *Fedwire* system handled 631,000 transfers per day with an average total daily value of €2.9 trillion (i.e. €2,900,000 millions).
  - In 2018, the Euro area’s *TARGET2* system processed a daily average of 347,000 transfers, with an average total value of €1.7 trillion.

- These systems ensure that your direct debit payments don’t bounce and that your credit or debit cards are accepted for payment.

- Keeping these systems working well, and seeking to improve the efficiency of payments, is an important part of central banking.
Financing Government Spending?

- We have noted already that central bank money creation can provide government with a source of revenue and this source of revenue has, at certain times and places, been an important one for governments.

- In recent years, economists advocating a “Modern Monetary Theory” (MMT) have advocated that central banks should print money to finance large amounts of government expenditure. They recommend that if the economy overheats, the government can take money out of circulation by raising taxes.

- These ideas are not really that modern. Much of this thinking dates back to the “two theories of money” debate discussed earlier, stemming from those who emphasised the key role of the state in monetary systems.

- In particular, Abba Lerner’s 1940s theory of “functional finance” outlined many of the ideas concerning the role of money creation in financing government that are promoted now by MMT.

- In practice, however, most modern central banks operate independently from fiscal authorities and often have explicit bans on using money creation to finance government spending. We will explore why in greater detail later.
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. How to describe a central bank’s balance sheet.
5. Do central banks need to have assets exceeding liabilities?
6. Implications of paying interest on reserves for central banks.
7. Reasons for risk control in managing central bank assets.
9. Why central banks play an important role in payments systems.
10. Why central banks are usually given a mandate to maintain financial stability.