CHAPTER

9 INTRODUCTION TO SOVEREIGN CURRENCY: THE GOVERNMENT AND ITS MONEY

Chapter Outline

Learning Objectives

- Explain why a fiat currency is valued and is acceptable in domestic transactions.
- Recognise the distinction between fixed and floating exchange rate regimes and their significance for the conduct of macroeconomic policy.
- Understand how IOUs are created and extinguished.

9.1 Introduction

In this chapter we will examine in more detail several of the concepts briefly introduced in earlier chapters of this textbook. We first turn to the money of account and the nation's currency and note that the latter is no longer backed by a precious metal, such as gold. We argue that the so-called **fiat currency** is valued and widely used in transactions because it is required as the means to pay taxes and other obligations levied by the state. All financial stocks and flows are denominated in the national money of account. In this context the financial system can be viewed as a record of transactions, that is, a scoreboard. We then examine the difference between floating and fixed exchange rate systems.

Government and non-government IOUs are denominated in the national currency, or money of account. After defining leveraging (use of debt), we argue that these different types of IOUs can be conceived of as a financial pyramid, with government IOUs at the top.

Finally, we emphasise the need to use the term 'money' very carefully to avoid confusion.

9.2 The National Currency (Unit of Account)

Let us look at money as the **unit of account** in which stocks and flows are denominated.

One nation, one currency

In Chapter 6, we introduced the concept of the money of account. The Australian dollar, the US dollar, the Japanese yen, the British pound, and the European euro are all examples of a money of account. The first four are each associated with a single nation which, throughout history, has been the usual situation: 'one nation, one currency'. There have been a few exceptions to this rule, including the modern euro, which is the money of account adopted by several countries that have joined the Economic and Monetary Union of the European Union (EMU). When we address the exceptional cases, such as the EMU, we will carefully identify the differences that arise when a currency is used, but not issued, by a nation.

Most of the discussion that follows will be focused on the more common case in which a nation adopts its own money of account. The government of the nation issues a currency (usually consisting of metal coins and paper notes of various denominations) denominated in its money of account. Spending by the government as well as tax liabilities, fees, and fines owed to the government are denominated in the same money of account. These payments are enforceable by law. More generally, broad use of a nation's money of account is ensured by enforcing monetary contracts in a court of law, such as the payment of wages.

In many nations there are private contracts that are written in foreign monies of account. For example, in some Latin American countries it is common to write some kinds of contracts in terms of the US dollar. It is also common in many nations to use US currency in payment. Many contracts governing international trade are denominated in US dollars, even if neither party uses that specific currency as their own. According to some estimates, the total value of US paper currency circulating outside America exceeds the value of US paper currency used at home. Much of this is thought to be involved in illegal activities, including the drug trade.

Thus, one or more foreign monies of account as well as the corresponding foreign currencies might be used in addition to the domestic money of account and the domestic currency denominated in that unit. Sometimes this is explicitly recognised, and permitted by, the authorities, while other times it is part of the underground economy that tries to avoid detection by using foreign currency. While we recognise these deviations from the 'one currency, one nation' rule, they generally account for a relatively small proportion of transactions and contracts, most of which will be denominated in the nation's own money of account.

Sovereignty and the currency

The national currency is often referred to as a **sovereign currency**, that is, the currency issued by the sovereign government. The sovereign government retains a variety of powers for itself that are not given to private individuals or institutions. Here, we are only concerned with those powers associated with money. The sovereign government alone has the power to determine which money of account it will recognise for official accounts. Further, modern sovereign governments alone are invested with the power to issue the currency denominated in each nation's money of account. For example, if any entity other than the US government tried to issue US currency it would be prosecuted as a counterfeiter, with severe penalties being imposed. (Enemy nations do sometimes try to undermine a nation's economy by counterfeiting its currency, hoping to cause inflation and destroy trust in the currency.)

As noted above, the sovereign government imposes tax liabilities (as well as fines and fees) in its money of account, and decides how these liabilities can be paid: that is, it decides what it will accept in payment so that taxpayers can fulfil their obligations.

Finally, the sovereign government also decides how it will make its own payments, when it purchases goods or services, or meets its own obligations, such as pensions to retirees. Most modern sovereign governments make payments in their own currency, and require tax payments in the same currency. For reasons that we will examine, requiring tax payments in the governments' currency ensures that the same currency will be accepted in payments made by government.

What 'backs up' the currency?

There has been ongoing confusion surrounding sovereign currency. For example, many policy makers and economists have had trouble understanding why the private sector would accept currency issued by the government when it made purchases. Some have argued that it is necessary to 'back up' a currency with a precious metal to ensure acceptance in payment.

Historically, governments have sometimes maintained a reserve of gold or silver (or both) against their currency. It was thought that if the population could always return currency to the government to obtain precious metal instead, then the currency would be accepted because it would be thought to be 'as good as gold'. Sometimes the currency itself did contain precious metal, as in the case of gold coins.

For example, in the US, the treasury maintained gold reserves equal to 25 per cent of the value of the issued currency until the late 1960s, but American citizens were not allowed to redeem currency for gold; only foreign holders of US currency could do so. However, the US and most nations have long since abandoned this practice. Even with no gold backing, the US currency is still in high demand all over the world. This demonstrates that the view that currency needs precious metal backing is erroneous.

Legal tender laws

Another explanation offered for a currency's acceptance are legal tender laws. Historically, sovereign governments have enacted legislation requiring their currencies to be accepted in payments. Indeed, paper currency issued in the US proclaims 'this note is legal tender for all debts, public and private'; Canadian notes say 'this note is legal tender'; and Australian paper currency reads: 'This Australian note is legal tender throughout Australia and its territories.' By contrast, the paper currency of the UK simply says: 'I promise to pay the bearer on demand the sum of five pounds' (in the case of the £5 note). On the other hand, the euro paper currency makes no promises.

Further, throughout history there are many examples of governments that passed legal tender laws, but still could not create a demand for their currencies, which were not accepted in private payments, and were sometimes even rejected in payments by the government. In some cases, the penalty for refusing to accept a king's coin included the burning of a red hot coin into the forehead of the recalcitrant. Hence, there are currencies that readily circulate without any legal tender laws as well as currencies that were shunned even with legal tender laws. Further, as we know, the US dollar circulates in many countries in which it is not legal tender (and even in countries where its use is discouraged by the authorities).

Fiat currency

Modern currencies are often called **fiat currencies** because there is no promise made by government to redeem them for precious metal. Their value is proclaimed by 'fiat' (the government legislates a new issue of currency and announces that a coin is worth a half dollar without holding a reserve of precious metal equal in value to a half dollar). Many students on economics courses are shocked when they are first told that there is 'nothing' backing the currency in their pockets but the government's 'fiat'. While they had probably never contemplated actually taking the currency down to the treasury to exchange it for gold, they had found comfort in the erroneous belief that there was 'something' standing behind the currency, perhaps a reserve of precious metal that was available for redemption.

The UK currency's 'promise to pay the bearer on demand the sum of five pounds' appears to offer a sound basis, implying that the treasury holds something in reserve that it can use to make the promised payments. However, if one were to actually present to the UK government a five pound note, the treasury would simply offer another five pound note, or a combination of coins that sum to five pounds! Any citizen of the US or Australia would experience the same outcome at their own treasuries: a five dollar note can be exchanged for a different five dollar note, or for some combination of notes and coins to make five dollars. That is the extent of the government's 'promise to pay'!

If currency cannot be exchanged for precious metal, and if legal tender laws are neither necessary nor sufficient to ensure acceptance of a currency, and if the government's 'promise to pay' really amounts to nothing, then why would anyone accept a government's currency? Let us try to determine the answer.

Taxes drive the demand for money

One of the most important powers claimed by a sovereign government is the authority to levy and collect taxes (and other payments made to government, including fees and fines). Tax obligations are levied in the national money of account, for example, dollars in the US and Australia, yen in Japan, pounds in the UK and so on. Further, the sovereign government also determines what can be delivered to satisfy the tax obligation. In all modern nations, it is the government's own currency (usually in the form of its central bank reserves, as we explain next) that is accepted in payment of taxes.

Some taxpayers use cheques drawn on private banks to make tax payments, whilst others will transfer the funds electronically to the government. When government receives these cheques and transfers, it debits the reserves of the private banks, which are held at the central bank. Reserves are just a special form of government currency used by banks to make payments to one another and to the government. Like all currency, reserves are the government's IOU. Effectively, private banks intermediate between taxpayers and government, making tax payments in currency (reserves) on behalf of the taxpayers. Once the banks have made these payments, the taxpayer has fulfilled their obligation, so the tax liability is eliminated.[1]

We are now able to answer the question posed above: why would anyone accept a government's 'fiat' currency? The answer is that the government's currency is the main (and usually the only) thing accepted by government in payment of taxes and other obligations to the government. It is true of course that government currency can be used for other purposes: coins can be used to make purchases from vending machines; private debts can be settled by offering government paper currency; and government money can be hoarded in piggy banks for future spending. However, these other uses of currency are all subsidiary, deriving from government's willingness to accept its currency in tax payments. It is because anyone with tax obligations can use currency to eliminate these liabilities that government currency is in demand, and thus can be used in purchases or in payment of private obligations.

The government cannot easily force others to use its currency in private payments, or to hoard it in piggy-banks, but government can force the use of its currency to meet the tax obligations that it imposes. For this reason, neither reserves of precious metals nor legal tender laws are necessary to ensure acceptance of the government's currency. All that is required is the imposition of a tax liability to be paid in the government's currency. The 'promise to pay' that is engraved on UK pound notes is superfluous and really quite misleading. We know that the UK treasury will not really pay anything (other than another note) when the five pound paper currency is presented. However, it will and must accept the note in payment of taxes. This is really how government currency is redeemed, not for gold but in payments made to the government. We will go through the accounting of tax payments in Chapter 20. It is sufficient for our purposes now to understand that the tax obligations to government are met by presenting the government's own IOUs to the tax collector.

We can conclude that **taxes drive money**. The government first creates a money of account (such as the dollar), and then imposes tax obligations in that national money of account. In all modern nations, this is sufficient to ensure that most debts, assets, and prices, will also be denominated in the national money of account. The government is then able to issue a currency that is also denominated in the same money of account, so long as it accepts that currency in tax payment. When we talk about the government 'issuing' currency, the most usual way in which this occurs is through government spending. We say **the government spends the currency into existence**. It can also make loans.

It is not necessary to 'back' the currency with precious metal, nor is it necessary to enforce legal tender laws that require acceptance of the national currency. For example, rather than engraving the statement 'This note is legal tender for all debts, public and private', all the US government needs to do is to promise 'This note will be accepted in the payment of taxes' in order to ensure its general acceptability within the US and even abroad.

In the Appendix to Chapter 2, we introduced the Buckaroos model which refers to the currency which US students acquire when they undertake hours of community service (CS) during each year of their degree programmes. Buckaroos (Bs) enable students to meet their tax obligations and this currency clearly has value, but is not backed by a previous metal. Buckaroos do not have widespread acceptability in the economy, because taxes are levied in $US by the government. However, it is quite conceivable that some transactions would occur

between students in which Buckaroos are exchanged for dollars. Some students may be prepared to undertake additional hours of CS, whereas others may be prepared to buy Buckaroos with dollars, rather than undertaking the required CS work.

In Box 9.1, we illustrate the argument that fiat currencies have value, despite not being backed by precious metal, by reference to the use of paper currency in colonial Virginia in the late 18th century.

BOX 9.1 AN HISTORICAL NOTE: PAPER NOTES AND REDEMPTION TAXES IN COLONIAL AMERICA

The notion that taxes drive money can be demonstrated through examination of the history of coinage and of the issue of paper money. In his examination of colonial Virginia's use of paper currency Farley Grubb (2015) demonstrates the principle of imposing taxes for redemption of paper notes. The American colonies were prohibited by England from issuing coin, so as to protect the King's monopoly of coinage. The colonies obtained coin from exports, but as a major mercantilist power, England limited colonial exports to the raw materials they needed. The colonies had to import finished goods, shipping the coins back to England. The King also wanted to limit expenditures on his empire, so the colonies were largely responsible for funding their expenses, which included fighting wars with the French, the Canadians, and Native Americans. Colonial governments were hence chronically short of British coins, obtained through taxes such as poll taxes and taxes on exports of slaves and tobacco.

To increase fiscal capacity, the colonial governments began to issue paper money. Virginia's colonial government passed a series of acts to authorise the issue of treasury paper notes. Each law would include the total value of notes (denominated in Virginia pounds) to be issued and would set a date for final 'redemption' (the term used by Grubb as well as by the lawmakers). Interestingly, the law would also impose a new set of taxes at the time of the note issue:

> *Every paper money act included additional new taxes, typically a land tax and a poll tax, that were operative for a number of years. The number of years over which these new additional taxes were operative was chosen so as to generate enough funds to fully redeem the notes authorised by each respective paper money act. The date in each paper money act set for the final redemption of the notes authorised by that act closely matched the end to the taxing period set by that act. (Grubb, 2015: 27)*

The Paper Money Acts that allowed the treasury to issue notes also imposed new taxes, with the recognition that the purpose of the taxes was to 'redeem' the currency. In fact, colonial paper money could be 'redeemed' in two ways: payment of taxes or presentation at the treasury for payment in (British) coins. The treasury would spend the newly issued paper money into the economy and those receiving the treasury notes could use it to pay taxes, or spend it, or submit it to the treasury in exchange for coins.

What did the treasury do with the notes it received in tax payment? Grubb (2015: 17) reports that the "notes were removed and burned", not spent. This runs counter to the common belief that a government needs tax revenue in order to spend. The colonial case shows that government first had to spend before it collected tax revenue, and once it received the revenue, the government burned it rather than spent it.

Grubb shows that most taxes were paid using the paper money, and most paper money was 'redeemed' in tax payment:

> *A redemption tax of 10,327£VA was collected, of which 2,527£VA was in specie that was explicitly set aside in a dedicated account to be used to redeem notes brought to the treasury. The rest of the tax payments were burnt, implying that those tax payments were made in notes. Therefore, 76 percent of this tax was paid in notes, and 24 percent was paid in specie. (Grubb, 2015: 29)*

What about the notes that were not 'redeemed' by either method? They continued to circulate:

> *[A]t the final redemption date holders of the respective notes did not rush to the treasury to exchange them for specie. The notes continued in circulation and note holders could cash them in at the treasury at their leisure. Robert Nicholas Carter, Virginia treasurer after 1766, noted this behavior, 'Most of the Merchants as well as others, ... preferred them (Virginia's treasury notes) either to Gold or Silver, as being more convenient for transacting the internal Business of the Country' (William and Mary College Quarterly Historical Magazine, 1912: 235). (Grubb, 2015: 30)*

Likewise, Adam Smith (1937[1776]) had argued that if the colonies were careful to ensure they did not create too much paper money relative to taxes, it would not depreciate in value (indeed it might even circulate at a premium, he argued). Redemption of the notes in tax payment would remove them from circulation, keeping them scarce. Grubb argues that this was well recognised by the colonial government:

> *The Virginia legislature took note redemption and its effect on controlling the value of its paper money seriously. Such is illustrated in the March 1760 paper money act which stated, 'And whereas it is of the greatest importance to preserve the credit of the paper currency of this colony, and nothing can contribute more to that end than a due care to satisfy the publick that the paper bills of credit, or treasury-notes, are properly sunk, according to the true intent and meaning of the several acts of assembly passed for emitting the same; and the establishing a regular method for this purpose may prevent difficulties and confusion in settling the publick accounts... (Hening 1969, v. 7, p. 353)'. (Grubb, 2015: 27–28).*

This emphasises the fact that the notes were removed from circulation to protect the value of the government's paper currency, not to provide 'revenue' that government could spend. The problem with spending notes in excess of redemption would not be government insolvency, but rather inflation. The taxes were meant not to 'raise revenue' for spending. The government also realised it needed to receive a portion of tax revenue in the form of coin. This was to ensure that it could meet its promise to redeem notes for coin.

Redemption of the tax obligations by returning paper notes to the treasury not only 'redeemed' the colonial government (in the sense that its paper note debts were extinguished), but it also redeemed the taxpayers who owed taxes. The redemption is mutual and simultaneous: both the 'creditor' – the taxpayer – and the 'debtor' – the note-issuing treasury – were redeemed. At the same time, the 'debtor' taxpayer was redeemed of the duty to pay taxes to the 'creditor' treasury. The four entries on the balance sheets were all simultaneously wiped clean.

Creation of the notes preceded their redemption in tax payment. Note creation (through government spending) logically comes before note redemption (through taxation). Indeed, it would have been impossible for the colonists to pay the new taxes given the chronic shortage of coin unless the notes were issued and spent first. Nor would the government have needed to impose the new taxes if it was not going to spend the notes!

What this shows is that modern interpretations of 'redemption' are based on a narrow definition that applies when the issuer of a currency promises to 'redeem' that currency for either gold (gold standard) or a foreign currency (fixed exchange rate) at a promised exchange rate. Of course, there are issuers who make such a promise. However, the more common (and more fundamental) promise is that of accepting one's own liabilities in payments due, such as taxes owed to the issuer of a sovereign currency. Even in this case, the sovereign can also promise to 'redeem' the currency for gold or foreign currency (the Virginia colony promised redemption in English coin). We see this as an additional promise that applies in some cases, but a promise that is now rare among developed nations (the EMU nations are an exception[2]). The promise to accept its own currency in payment is the more common and indeed universal promise of 'redemption'. And it is sufficient to 'drive' a currency.

Financial stocks and flows are denominated in the national money of account

Financial stocks and financial flows are denominated in the national money of account. While working, the employee earns a flow of wages that are denominated in money, effectively accumulating a monetary claim on the employer (see Chapter 6). On payday, the employer eliminates the obligation by providing a wage payment via, say, an electronic transfer to the worker's bank account, that is a liability of the employer's bank. Again, that is denominated in the national money of account. If desired, the worker can draw on that bank deposit and receive the government's currency, again an IOU of the government.

Any disposable income that is not used for consumption purchases represents a flow of saving, accumulated as a stock of wealth. In this case, the saving is held as a bank deposit, that is, as financial wealth. These monetary stocks and flows are conceptually nothing more than accounting entries, measured in the money of account. We can easily imagine doing away with coins and paper notes as well as cheque books, with all payments made through electronic entries using computers connected via the internet. All financial wealth could similarly be accounted for without use of paper.

In Chapter 5, we carefully examined the definitions of stocks (for example, wealth) and flows (for example, income, spending, and saving), as well as the relationships between them.

The financial system as an electronic scoreboard

The modern financial system can be seen as an elaborate system of record keeping, a sort of financial scoring of the game of life in a capitalist economy. Financial scoring can be compared with a scoreboard at a sporting event. When a team scores, the official scorer awards points, and electronic pulses are sent to the appropriate combination of LEDs so that the scoreboard will show the number of points awarded. As the game progresses, points totals are adjusted for each team. The points have no real physical presence; they simply reflect a record of the performance of each team according to the rules of the game. They are not 'backed' by anything, although they are valuable because the team that accumulates the most points is deemed the 'winner', and perhaps rewarded with fame and fortune. Further, in accordance with applicable rules, points might be taken away after review by officials who determine that rules were broken and that penalties should be assessed. The points that are taken away don't really go anywhere; they simply disappear as the scorekeeper deducts them from the score.

Similarly, in the game of life, earned income leads to 'points' credited to the 'score' that is kept by financial institutions. Unlike a sporting contest, in the game of life, every 'point' that is awarded to one player is deducted from the 'score' of another, either reducing the payer's assets or increasing their liabilities. Accountants in the game of life are very careful to ensure that financial accounts always balance. The payment of wages leads to a debit of the employer's 'score' at the bank, and a credit to the employee's 'score', but at the same time, the wage payment eliminates the employer's implicit obligation to pay wages as well as the employee's legal claim to wages. So, while the game of life is a bit more complicated than the football game, the idea that record keeping in terms of money is a lot like record keeping in terms of points can help us to remember that money is not a 'thing' but rather is a unit of account in which we keep track of all the debits and credits, or 'points'.

When thinking about the 'scores' the currency-issuing government might record (via government spending the currency into existence), it doesn't make sense to say that the government can run out of money. That would be like saying a game must be terminated at some point before the scheduled end because the scorer had run out of scores to post on the scoreboard. We will come back to that point in later chapters.

9.3 Floating versus Fixed Exchange Rate Regimes

An **exchange rate** is the amount of currency A that can be purchased by a unit of currency B in what we call the foreign exchange market. We will consider these markets in more detail in Chapter 24. Government can allow its currency to be freely exchanged at whatever value the foreign exchange market determines (floating rates) or try to manage the exchange value, usually under multilateral agreements between nations (fixed rates). These different arrangements have implications for the conduct of economic policy, which we will briefly consider in this section.

In previous sections, we dealt with the case of governments that do not promise to convert their currencies on demand into precious metals or anything else. When a five dollar note is presented to the US Treasury, it can be used to pay taxes or it can be exchanged for some combination of notes and coins that sums to five dollars, but the US government will not convert it to anything else. Further, the US government does not promise to maintain the exchange rate of US dollars against other currencies at any particular level. This is the typical situation for most nations.

Most of this textbook will be concerned with sovereign currencies which operate with **floating exchange rates** against other currencies, so that they are not convertible at a fixed rate to another currency. Examples of such currencies include the US dollar, the Australian dollar, the Canadian dollar, the UK pound, the Japanese yen, the Turkish lira, the Mexican peso, the Argentinian peso, and so on.

What are the differences between fixed and floating exchange rates and what are the implications of this distinction?

The gold standard and fixed exchange rates

A century or so ago, many nations operated with a gold standard in which the country not only promised to redeem its currency for gold, but also promised to make this redemption at a fixed exchange rate. An example of a fixed exchange rate is a promise to convert 35 US dollars to one ounce of gold. For many years, this was indeed the official US exchange rate. Other nations also adopted fixed exchange rates, pegging the value of their currency either to gold, or after the Second World War, to the US dollar. For example, at the inception of the post-war system, known as the Bretton Woods system, the official exchange rate for the UK pound per US dollar was 0.2481 (on 27 December 1945). This is equivalent to a person receiving four US dollars for each UK pound presented for conversion. As all other currencies in the system were set relative to the US dollar, this also set their values relative to each other. So on 27 December 1945, 119.1 French francs exchanged for one US dollar, which meant that 480 francs were required to purchase one UK pound. In Chapter 24, we will learn how to interpret exchange rate quotations and to calculate various cross parities.

In order to make good on its promises to convert its currency at fixed exchange rates, each nation had to keep a reserve of foreign currencies (and/or gold). For example, if a lot of UK pounds were presented for conversion to US dollars (for example, by foreign central banks to the Bank of England), the UK's reserves of foreign (mostly dollar) currency could be depleted rapidly. There were three strategies that could be adopted by the UK government to avoid running out of foreign currency reserves, but none of them were very pleasant. They included: (a) alter the value of the pound against the US dollar, that is, devalue; (b) borrow foreign currency reserves; or (c) deflate the economy using higher interest rates and/or fiscal cutbacks to curtail imports and attract capital inflow.

Under this fixed exchange rate system, countries with trade deficits (exports less than imports) always had difficulties maintaining the agreed exchange parity because the trade deficit manifests in foreign exchange markets as an excess supply of the nation's currency relative to all other currencies. This is because when a nation sells exports, foreign buyers must supply their own currency in return for that nation's currency, and when a nation buys imports, it must supply its own currency in return for the currency of the nation from which it is importing. Thus, a trade deficit amounts to an excess supply of the deficit nation's currency in the foreign exchange market, which pushes the price (exchange rate) downwards. To arrest the decline in the exchange rate, the central bank is required to buy up its currency in the foreign exchange market using stocks of foreign currency, which eliminates the excess supply. However, nations with chronic trade deficits sooner or later ran out of stores of foreign currencies. These pressures eventually undermined the viability of the Bretton Woods system and it collapsed in August 1971.

Floating exchange rates

In August 1971, US President Nixon abandoned US participation in the fixed exchange rate system because the USA was unable to continue to guarantee conversion of US dollars into gold at the agreed price. Many countries followed suit. This meant that these governments no longer promised to convert their currency to another

currency (or gold) at a fixed rate. As a result, the relative values of currencies against one another were allowed to float, meaning that they would be determined hour by hour according to forces of demand and supply in the foreign exchange market.

Today it is easy to convert most currencies, including floating currencies, into any other major currency at private banks and at kiosks in international airports. Currency exchanges enact these conversions at the current exchange rate set in international markets (minus the fees charged for the transactions). These exchange rates change day by day, or even minute by minute, fluctuating to match demand (from those trying to obtain the currency in question) and supply (from those offering that particular currency in exchange for other currencies).

The determination of exchange rates in a floating exchange rate system is exceedingly complex. The international value of the US dollar, for example, might be influenced by such factors as the demand for US assets, the US trade balance, US interest rates relative to those in the rest of the world, US inflation, and US growth relative to that in the rest of the world. So many factors are involved that no statistical model that can reliably predict movements of exchange rates has been developed yet.

What is important for our analysis however is that with a floating exchange rate, a government does not need to fear that it will run out of foreign currency reserves (or gold reserves) for the simple reason that it does not convert its domestic currency to foreign currency at a fixed exchange rate. Indeed, the government does not have to promise to make any conversions at all. In practice, governments operating with floating exchange rates hold foreign currency reserves, and they offer currency exchange services for the convenience of their financial institutions. However, the conversions are done at current market exchange rates, rather than keeping the exchange rate at a prescribed level.

Governments intervene into currency exchange markets to try to nudge the exchange rate in the desired direction. They also will use macroeconomic policy (including monetary and fiscal policy, as discussed in Chapter 20) in an attempt to affect exchange rates. Sometimes this works, and sometimes it does not. The point is that with a floating exchange rate attempts to influence exchange rates are discretionary. By contrast, with a fixed exchange rate government must use policy to try to keep the exchange rate fixed.

The floating exchange rate ensures that the government has greater freedom to pursue other policy goals, such as maintenance of full employment, sufficient economic growth, and price stability. How it might do that is discussed in later chapters.

9.4 IOUs Denominated in National Currency: Government and Non-Government

In previous sections we have noted that assets and liabilities are denominated in a money of account, which is chosen by a national government and given force through the mechanism of taxation. With a floating exchange rate, the government's own IOUs – its currency – are non-convertible in the sense that the government makes no promise to convert them to precious metal, to foreign currency, or to anything else. Instead, it promises to accept its own IOUs in payments made to itself (mostly tax payments, but also payments of fees and fines). This is the necessary and fundamental promise made: the issuer of an IOU must accept that IOU in payment. So long as the government agrees to accept its own IOUs in tax payments, the government's IOUs will be in demand (at least for tax payments, and probably for other uses as well).

Similarly, private issuers of IOUs also promise to accept their own liabilities. For example, if you have a loan with your bank, you can always pay the principal and interest on the loan by writing a cheque on your deposit account at the bank. Actually, all modern banking systems operate a cheque clearing facility so that each bank accepts cheques drawn on all other banks in the country. This allows anyone with a debt due to any bank in the country to present a cheque drawn on any other bank in the country for payment of the debt. The cheque clearing facility then operates to settle accounts among the banks. This topic will be discussed in detail in Chapter 20. The important point is that banks accept their own liabilities (cheques drawn on deposits) in payments on debts due to banks (the loans banks have made), just as governments accept their own liabilities (currency) in payments on debts due to government (tax liabilities).

Leveraging

There is one big difference between government and banks, however. Banks do promise to convert their liabilities to something. You can present a cheque to your bank for payment in currency, what is normally called 'cashing a cheque', or you can simply withdraw cash at the Automatic Teller Machine (ATM) from one of your bank accounts. In either case, the bank IOU is converted to a government IOU. Banks normally promise to make these conversions either 'on demand' (in the case of 'demand deposits', which are normal cheque accounts) or after a specified time period (in the case of 'time or term deposits', including savings accounts and certificates of deposit, known as CDs, perhaps with a penalty for early withdrawal).

Because banks make this promise to convert on demand, they must either hold reserves of currency, or have quick access to them. Their reserves take the form of vault cash plus deposits held at the central bank. Note that they need to hold only a small amount of reserves against their deposits because they know that redemptions (withdrawals) over any short period will be a tiny fraction of their total deposits.

The fraction of reserves against deposits is called the reserve ratio. We can think of deposits as **leveraging** the reserves. For example, in the USA, the ratio of reserves against bank deposits is around one per cent. This means the leverage ratio is 100 to one.

Banks hold a relatively small amount of currency in their vaults to handle conversions on demand, but most of their reserves take the form of deposits at the central bank. If they need more currency, they ask the central bank to send an armoured truck with the desired notes and coins. For our purposes here, bank reserves (deposits at the central bank) are equivalent to vault cash because a bank can immediately convert them to currency to meet cash withdrawals. There is no functional difference between cash held in bank vaults and reserve deposits held at the central bank. We can include both as currency, government liabilities with zero time to maturity.

Banks don't like to hold a lot of vault cash or reserves, nor do they need to do so in normal circumstances. Holding lots of cash on the premises could increase the attractiveness of a bank to robbers, but the main reason for minimising holdings is that it is costly to hold currency. The most obvious costs are the vault and the need to hire security guards. However, more important to banks is the fact that holding reserves does not earn much profit. Banks would rather hold loans as assets because debtors pay interest on these loans. For this reason, banks operate with high leverage ratios, holding a very tiny fraction of their assets in the form of reserves against their deposit liabilities. So long as only a small percentage of their depositors try to convert deposits to cash on any given day, this is not a problem. However, in the case of a bank run (in which a large number of customers try to convert their deposits to cash on the same day), the bank will have to obtain currency from the central bank. This can even lead to a lender of last resort action by the central bank in lending currency reserves to a bank facing a run. These are issues that we will address in Chapter 23.

Clearing accounts extinguish IOUs

There is another reason that banks hold reserves. When you write a cheque on your bank account to pay a bill, the recipient of the cheque will deposit it in their own bank, which is probably a different bank. Their bank will present the cheque to your bank for payment. This is called **clearing accounts**. Banks clear accounts using government IOUs, and for that reason banks maintain reserve deposits at the central bank. More importantly, they have access to more reserves should they ever need them, both through borrowing from other banks in the interbank market for reserves (an overnight market where banks lend to and borrow from each other), or through borrowing them from the central bank. All modern financial systems have developed procedures to ensure banks can get currency and reserves as necessary to clear accounts among themselves and with their depositors. The central bank is duty bound to provide banks with sufficient reserves should they fall short on any particular day.

When First National Bank receives a cheque drawn on Second National Bank, it asks the central bank to debit the reserves of Second National and to credit its own reserves. This is now handled electronically. Note that while Second National's assets will be reduced (by the amount of reserves debited), its liabilities (cheque deposit) will be reduced by the same amount. Similarly, when a depositor uses the ATM to withdraw currency, the bank's assets (cash reserves) are reduced, and its IOUs to the depositor (the liabilities in the deposit account) are reduced by the same amount.

Other business firms use bank liabilities for clearing their own accounts. For example, a retail firm typically receives products from wholesalers on the basis of a promise to pay after a specified time period (usually 30 days in the US). Wholesalers hold these IOUs until the end of the period, at which time the retailers pay by a cheque drawn on their bank account or by an electronic transfer from their account to the account of the wholesaler. At this point, the retailer's IOUs held by the wholesaler are cancelled.

Alternatively, the wholesaler might not be willing to wait until the end of the period for payment. In this case, the wholesaler can sell the retailer's IOUs at a discount (for less than the amount that the retailer promises to pay at the end of the period). The discount is effectively interest that the wholesaler is willing to pay to get the funds earlier than promised. The retailer effectively earns interest (the difference between the amount paid for the IOUs and the amount paid to the wholesaler to extinguish the IOUs). Again, the retailer's IOU is cancelled by delivering a bank liability (the holder of the retailer's IOU receives a credit to their own bank account). As we will see in Chapter 23, discounting is the basis of both commercial banking and of interest rates.

Pyramiding currency

Another important point is that private financial liabilities are not only denominated in the government's money of account, they also are ultimately convertible into the government's currency. As we have discussed, banks explicitly promise to convert their liabilities to currency (either immediately in the case of demand deposits, or with some delay in the case of time deposits). Other private firms mostly use bank liabilities to clear their own accounts. Essentially, this means they are promising to convert their liabilities to bank liabilities, 'paying by cheque' on a specified date (or according to other conditions specified in the contract). For this reason, they must have deposits, or have access to deposits, with banks to make the payments.

Things can get even more complex than this because there is a wide range of financial institutions (and even non-financial institutions offering financial services) that can provide payment services. These organisations can make payments for other firms, with net clearing among these 'non-bank financial institutions' occurring using the liabilities of banks. Banks in turn clear accounts using government liabilities. There could thus be 'six degrees of separation' (many layers of financial leveraging) between a creditor and a debtor involved in clearing accounts.

We can think of a pyramid of liabilities, with different layers corresponding to the degree of separation from the central bank. Perhaps the bottom layer consists of the IOUs of households that are held by other households, by firms engaged in production, by banks, and by other financial institutions. The important point is that households usually clear accounts by using liabilities issued by those higher in the debt pyramid, typically financial institutions.

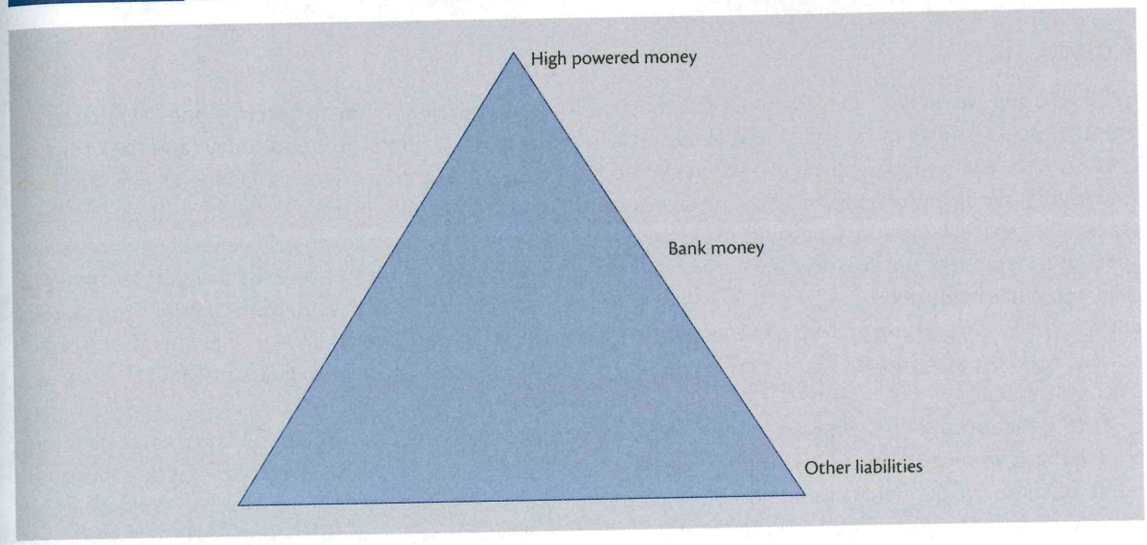
The next layer up from the bottom consists of the IOUs of firms engaged in production, with their liabilities held mostly by financial institutions higher in the debt pyramid (although some are directly held by households and by other production firms), and who mostly clear accounts using liabilities issued by the financial institutions, sometimes called shadow banks.

At the next layer we have non-bank financial institutions, which in turn clear accounts using the banks whose liabilities are higher in the pyramid. Banks use government liabilities for net clearing.

Finally, the government is at the top of the pyramid, with no liabilities higher than its non-convertible IOUs. The shape of the pyramid is instructive for two reasons. First, there is a hierarchical arrangement whereby liabilities issued by those higher in the pyramid are generally more acceptable. In some respects, this is due to higher creditworthiness because the government's liabilities are free of credit risk. As we move down the pyramid through bank liabilities, toward non-financial business liabilities, and finally to the IOUs of households, risk tends to rise, although this is not a firm and fast rule. Second, the liabilities at each level typically leverage the liabilities at the higher levels. In this sense, the whole pyramid is based on leveraging (a relatively smaller number of) government IOUs. This is a concept to which we will return in the next section.

Figure 9.1 shows a 'pyramid' (as per the concept developed by Hyman Minsky and Duncan Foley, and extended by Stephanie Bell) which provides a visual representation of the concept of leveraging. At the top of the pyramid are the government's liabilities, which we refer to as the monetary base, and constitute the sum of all bank

Figure 9.1 The Minsky–Foley pyramid



reserves held in the central bank clearing accounts and outstanding currency (notes and coins). At the bottom of the pyramid we include all other money-denominated liabilities (these could include the IOUs of non-financial firms as well as those of households).

9.5 Use of the Term 'Money': Confusion and Precision

Before concluding this chapter, we will briefly distinguish between our use of the term 'money' and the way it is often used. 'Money' is often used colloquially to refer to income, as in asking 'how much money do you make at your job?'. As was discussed in Chapter 5, income is a flow measured in nominal terms, that is, in the money of account. In this book, we will always carefully distinguish flows from stocks, and will not use the term 'money' in place of 'income'.

The term 'money' is also often used to indicate a particular liability, such as the demand deposit liability of a bank, or the currency IOU of the government. In fact, as we have discussed above, all financial liabilities are denominated in a money of account. It is thus rather arbitrary to call some of these 'money' and to exclude others. Further, each time one uses the term 'money' to refer to money-denominated liabilities in general, one must provide a list of those that are included as 'money' or a list of those that are excluded. Otherwise, we can never be sure what the speaker means.

Throughout this book, we will carefully distinguish between the money of account (the US dollar or the Australian dollar, for example), and specific money-denominated liabilities (demand deposits issued by banks or currency issued by the government, for example). The term 'money' simply refers to the unit of account chosen by government to denominate tax liabilities and payments made to government, the dollar in both the US and Australia.

As we have discussed, money does not have any physical existence but rather is the unit in which we can keep track of debts and credits, much as a 'point' is the unit of account used in a game of football to keep track of goals scored. Just as the score in football is denominated in goals, a coin is denominated in dollars (or fractions of a dollar). A goal in football takes a physical form (a player kicking the football into a specified area), but the points used to 'account' for the goal do not have any physical presence. In the same manner, a ten dollar note issued by a government has a physical form (a piece of paper imprinted with ink), but the ten dollars owed by the government that it 'accounts' for do not. We can think of the paper note as just the written record of the government's IOU. What does it owe you? The right to discharge your ten dollars of tax liabilities using the ten dollar 'record' of the government's IOU.

Conclusion

In this chapter we defined and examined the characteristics of a sovereign money system – one in which a government issues its own currency. We explained that most countries around the world today (and back through history) have each adopted their own currency because this is linked to a country's independence and fiscal sovereignty. We also explained why floating exchange rate regimes generally provide the greatest fiscal and monetary policy space. By contrast, pegging an exchange rate to a foreign currency or to gold generally reduces policy space and creates the possibility that a nation will be forced to default on the promise to convert its currency on demand. While many people believe that it is necessary to 'back' a currency with something of value (gold, foreign currency), this chapter introduced the concept that 'taxes (or other obligations) drive money'. In other words, if citizens need the government's currency to pay taxes, then that will be sufficient to guarantee that the currency will be accepted.

Finally, the concept of 'leveraging' of the state's currency was discussed. Private debts and credits are denominated in the government's money of account (the same money of account in which the currency is denominated). Some of these private debts (most notably, bank demand deposits) are made convertible on demand to the state's currency. These are 'cleared' using the state's currency. Other types of private debts are cleared using bank liabilities. This led to the notion of a 'pyramid' of liabilities with the government's liabilities at the top, 'leveraged' by those lower in the pyramid.

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Endnotes

1. The tax payment reduces the worker's financial wealth because their bank account is debited by the amount of the tax payment. At the same time, the government's asset (the tax liability owed by the worker) is eliminated when the taxes are paid, and the government's liability (the reserves held by private banks) is also eliminated. This is an example of the operation of the payments system, which will be analysed in greater detail in Chapter 20.
2. Each member nation issues Euro-denominated currency and bonds that are convertible to European Central Bank liabilities at par.

Visit the companion website at www.macmillanihe.com/mitchell-macro for additional resources including author videos, an instructor's manual, worked examples, tutorial questions, additional references, the data sets used in constructing various graphs in the text, and more.

CHAPTER

10 MONEY AND BANKING

Chapter Outline

Learning Objectives

- Gain an understanding of definitions of the money supply and financial assets.
- Recognise the sharp distinction between the MMT and orthodox representations of the process of credit creation by banks.
- Be able to interpret a bank balance sheet and incorporate changes via flows of new transactions.

10.1 Introduction

In this chapter, we have several objectives. First we will introduce students to commonly used definitions of the **money supply**. Frequent reference has been made in earlier chapters to the purchase or sale of financial assets by both the government through the central bank and treasury, as well as by banks. Here we will provide students with a clear understanding of the generic characteristics of these **financial assets**. We then devote space to developing an understanding as to how banks behave in a modern monetary economy. In the process, we will expose some long-standing myths about the role that banks play in the operation of the financial system.

10.2 Some Definitions

Monetary aggregates

Economists and commentators draw inferences about the economy from trends over time in monetary aggregates. Several measures of monetary aggregates have been devised over the years, but there is some variation across countries in what components are included under each measure. The different measures published by central banks are sometimes summarised as M0, M1, M2, M3 and M4 and reflect varying degrees of liquidity

(convertibility into cash). It is common to consider the highest-liquidity measures M0 and M1 as **narrow money** while M2, M3 and M4 are considered to measure **broad money**.

M0 is also termed the **monetary base**. In countries such as Australia and the UK it includes circulating notes and coins held by the non-government sector, including banks; the deposits of banks with the central bank (generally called 'reserves'); and other central bank liabilities to the non-government sector. In the USA the monetary base is defined in the same way, but the term M0 is not used. The monetary base is the most liquid measure of the money supply and is also sometimes referred to as **high powered money** (HPM), due to its use as a reserve that is leveraged by private banks that issue their own money-denominated liabilities such as deposits.

M1 typically comprises notes and coins in circulation plus current bank deposits held by the private non-bank sector. In some nations, it includes travellers' cheques and deposit accounts that cheques can be written against. It is also a liquid measure of the money supply because its components are readily available to be used for spending on goods and services.

The US Federal Reserve defines M2 as M1 plus most savings accounts, money market accounts, retail money market mutual funds, and small denomination time deposits (certificates of deposit of under $100,000). M2 is a less liquid measure of the money supply and movements in it are typically used to forecast inflation.

M3 broadens the narrow measures to include less liquid components such as long-term time deposits. Even broader still are M4 measures which add other illiquid assets to the aggregate, such as borrowings from the private sector by non-bank financial intermediaries.

Not all measures are published by all central banks. The US, for example, only publishes the monetary base, M1 and M2. In the UK, there are only two official money supply measures (M0 and M4). The European Central Bank publishes M1, M2 and M3, while in Australia the central bank publishes M0, M1, M3 and M4 (or broad money measure).

10.3 Financial Assets

If a household engages in saving (a flow per period of time) over a number of months or years, then it will accumulate a growing stock of wealth. The household needs to decide whether to continue to add its saving to its existing deposits at its bank or put together a portfolio of financial assets which have different degrees of risk, for example, stocks (shares) or bonds, and are also denominated in the money of account.

Treasuries in modern economies issue bonds which are debt of various maturities; also called securities. These financial assets are bought and sold by the central bank, private banks and the private sector. Private entities (for example, corporations) also issue bonds.

In general, the bond acknowledges that the **issuer** is indebted to the **bondholder**. The bond issuer must pay interest to the bondholder on a periodic basis, and repay the principal (face value of the bond) when the bond matures. Bonds represent wealth for bondholders.

Thus, a **bond** is a **formal contract** to repay a loan (IOU) with interest at fixed intervals. The bondholder is the lender (creditor). The borrower (debtor) issues the bond and the **coupon** is the interest rate paid on the **face value** of the bond, and usually printed on the bond. In these cases, the periodic interest payments are constant.

The **issue price** is what investors pay for the bond when it is first issued. Later, bonds may be traded; at a premium (above par, if good quality, so that there is minimal default risk by the issuer) or at a discount (price below par). The bonds of a currency-issuing government carry zero default risk because such a government can always meet its outstanding liabilities. For this reason, these bonds are very desirable in times of uncertainty.

A **consol** is a special type of bond called a perpetuity, which means there is no maturity date. Interest is paid on this asset forever.

When we talk of the **government bond market** we need to differentiate between the primary and secondary bond markets. A **primary market** is the institutional machinery by which the government sells debt to the non-government sector. While many mistakenly believe that the issuance of bonds in the primary market is designed to raise funds to facilitate government spending, the reality is that currency-issuing governments are not

financially constrained (see, for example, Chapter 1) and therefore we must seek a different explanation of why such governments issue debt at all to the non-government sector. We deal with those questions in more depth in Part E of this textbook (*Economic Policy in an Open Economy*).

A **secondary market** is where existing government bonds are bought and sold by interested parties after the bonds enter the monetary system via the primary market. The same arrangements apply, for example, to private share issues (also called equities or stocks). The company raises funds via the primary issuance process and then its shares are traded in secondary markets.

Government bonds are thus negotiable because ownership of the certificate can be transferred (sold) to another owner in the secondary bond market. However, it is important to understand that once the bond is issued, subsequent trading has no impact at all on the volume of financial assets in the system since it just shuffles this wealth between wealth holders.

The process of issuance in primary markets varies across nations and has also varied over time. A typical arrangement in the past was that government bonds would be sold to selected dealers (for example, banks) on a periodic basis in the primary market. Government would determine how much debt it wanted to issue (expressed in the money unit of account) and set a yield it was prepared to pay to the purchasers. The terms offered by this 'take it or leave it' approach might not be attractive to the non-government sector at the time of offer so any shortfalls in purchases of what the government desired to issue would be taken up by central banks. This is a case of government issuing debt to itself, which brings into question the whole logic of issuing debt.

In the late 1970s, the dominant school of economic thought was Monetarism, which erroneously claimed that central bank purchases of debt would be inflationary. Governments fell prey to that logic and started to devise ways to preclude their central banks from purchasing unsold debt. Governments would thus set yields and sell as much debt as possible, but would continuously adjust the yields up or down to meet the market requirements and ensure that there were no discrepancies between net spending (fiscal deficits) and bond sale revenue.

This system gave way to a purer auction system which avoided any claims that the government was manipulating yields, again in response to calls for more 'free' market activity. These auction or tender systems became dominant internationally. In general terms, the treasury would announce the terms of the auction, including how much debt was available for sale, the maturity dates of the debt, and the coupon rate (the periodic interest to be paid on the face value of the bond). The issue would then be put out for tender and then the bond dealers in the primary market would determine the final price of the bonds issued – thus taking discretion away from the elected government in terms of the yields that it would pay on government debt issuance.

As an example, imagine a $1,000 bond had a coupon of five per cent, meaning that you would get $50 per annum until the bond matured, at which time you would get $1,000 back. At the time of issue, the bond market dealers desired a yield of six per cent to satisfy their profit expectations. In this case, the initial specification is unattractive. Prior to the adoption of an auction system, private bond dealers would avoid purchasing the bond under such conditions. But under the auction system they could put in a purchase bid lower than the $1,000 to ensure they got the six per cent return sought on the price that they were willing to pay.

It is important to understand that there is an **inverse relationship between the traded price of a fixed income bond and its yield (rate of interest)**. Why is that so? The general rule for fixed income bonds is that when their prices rise in secondary markets, the yield falls and vice versa. This is because if one pays more to purchase a bond, the coupon payments represent a lower return on the purchase price; on the other hand if one pays less, then the coupon payments represent a higher return. Furthermore, the price of a bond can change in the marketplace according to interest rate fluctuations, even though the bondholder will still only get the face value of the bond back upon maturity.

When interest rates rise elsewhere in the economy, the price of previously issued bonds falls because they are less attractive in comparison to the newly issued bonds, which are offering higher coupon rates (reflecting current interest rates). When interest rates fall, the price of older bonds increases as they become more attractive given that newly issued bonds offer a lower coupon rate than the older higher coupon rated bonds.

The government department that manages these auction processes receives tenders from the bond market traders in the primary bond market. These will be ranked in terms of price (and implied yields desired) and the quantity requested in dollar terms. The bonds are then issued in order of the highest price bid down until the volume the government desires to sell is achieved. So, the first bidder with the highest price (lowest yield) gets their desired volume (as long as it doesn't exhaust the whole tender, which is unlikely). Then the second bidder (higher yield) receives their allocation and so on. In this way, if demand for the tender is low, the final yields will be higher and vice versa.

Bonds are also issued and sold in primary markets by state or provincial governments, multinational and local companies, credit institutions and other public bodies. Companies can finance new capital investment by one or more of the following: (i) issuing bonds, (ii) using retained profits, and (iii) launching a new share issue.

Treasuries and other institutions issue bonds with different times to maturity. For example, the US Department of the Treasury issues bonds of one month, three month, six month, one year, two year, three year, five year, seven year, ten year, twenty year and thirty year duration; a ten year treasury bond matures in ten years, and so on.

Yield concepts in fixed income investments

The yield indicates the return that will be returned from the investment and is usually expressed in percentage terms. There are several concepts of yield that are used in the markets.

- **Coupon or Nominal Yield** – If a bond has a face value of $1,000 and is paying eight per cent in interest (the coupon rate), then the nominal yield is eight per cent. The investor will thus receive $80 per annum until maturity. The coupon yield remains constant throughout the life of the bond.
- **Current Yield** – Suppose you purchase an eight per cent $1,000 bond for $800 in the secondary market. Irrespective of the price you pay, the bond entitles you to receive $80 per year in coupon payments. But unlike the previous example, the $80 payment per year until maturity represents a higher current yield than eight per cent on your investment because it is based on your purchase price of $800. The actual yield is $80/$800 = ten per cent. So, to compute current yield you simply divide the coupon by the price you paid for the bond. In general, if you buy the bond at a discount to face value, the current yield will be greater than the coupon yield, and if you buy at a premium then the current yield will be below the coupon yield.
- **Yield to Maturity (YTM)** – The current yield does not consider the difference between the purchase price of the bond and the principal payment at maturity. YTM considers that in addition to earning interest, an investor can make a realised capital gain or loss by holding the bond until its maturity date. YTM is a measure of the investor's true gain over the life of the bond and is the most accurate method of comparing bonds with different maturity dates and coupon values.

BOX 10.1 WORKED YIELD EXAMPLE

Assume you pay $800 for a $1,000 face value bond in the secondary market. The $200 discount on the face value is considered income or yield and must be included in the yield calculations. Assume that the eight per cent $1,000 bond has five years left to maturity when bought for $800.

A comparison of three yield concepts gives:

- Coupon yield of eight per cent ($80 income flow divided by $1,000 face value).
- Current yield of ten per cent ($80 income flow divided by $800 discounted purchase price).
- YTM of 13.3 per cent. The working is given in the main text below.

The computation of YTM is complex and can be simplified to the following rule of thumb:

$$YTM = (C + PD)/[0.5 \times (FV + P)]$$

where C is the coupon, PD is the prorated discount, FV is the face value, and P is the purchase price. PD is the difference between the face value and the purchase price, divided by the number of years to maturity. If the bond is trading at a premium, the PD is negative which means that the YTM is less than the coupon yield.

Using the data in the Worked Example, therefore:

$$YTM = [80 + (200/5)]/[0.5 \times (\$1{,}000 + \$800)] = \$120/\$900 = 13.3 \text{ per cent.}$$

When bond traders talk about yield they are usually referring to the YTM measure which is the only measure that takes into account the effect of principal price, coupon rate, and time to maturity of a bond's actual yield.

There are two ways we can use data on yields for government bonds of different maturities to assess the state of the economy and the degree to which the non-government sector expects inflation to increase in the future. We have seen that rising yields signal weakening prices due to falling private demand for the assets in question. This could reflect a strengthening economy with investors being prepared to acquire more risky assets and less very safe ones. This is also usually when the central bank pushes up the target interbank rate and bond yields more or less follow (see Chapter 20). Further, we can use the movements in yields to gauge what is happening to inflationary expectations in the non-government sector. Rising yields on longer-term maturities indicate that the private markets sense inflation will rise in the future and so they desire to protect real yields by increasing the nominal yields on the bonds.

The second way of looking at the yields is to consider the **yield curve**. The yield curve is a graphical depiction of the **term structure of risk-free interest rates** and plots the maturities of different government bond on the horizontal axis against their respective yields (rates of return) on the vertical axis (see Figure 10.1, which shows the US Treasury yield curve for 3 February 2016).

There are various theories about the yield curve and its dynamics. All share some common notions, in particular that the higher is expected inflation, the steeper the yield curve will be, other factors being equal.

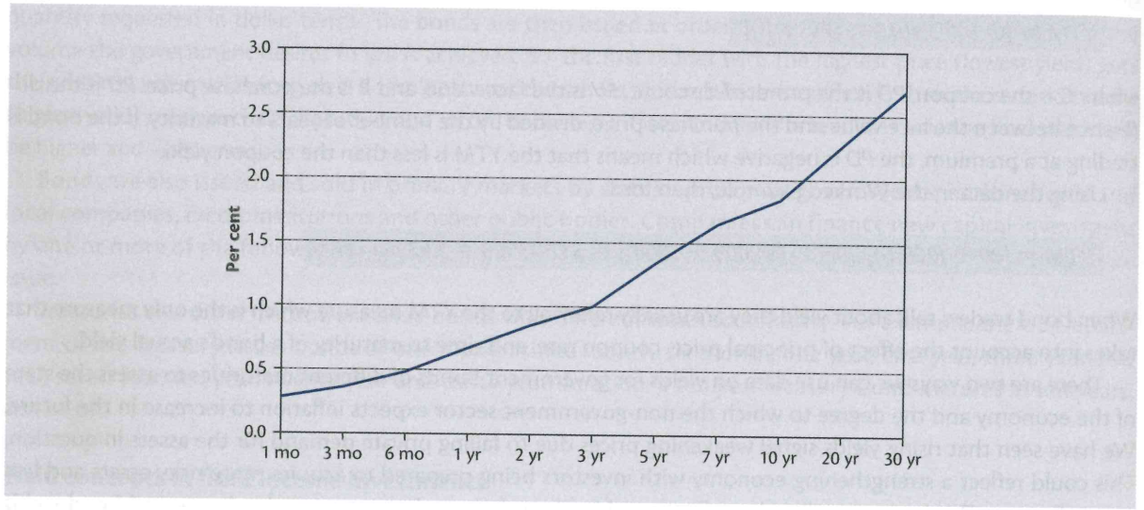
The basic principle linking the shape of the yield curve to the economy's prospects is explained as follows. The short end of the yield curve reflects the interest rate set by the central bank, which sets the competitive rate for cash (highly liquid assets) in the economy. As the short-term interest rate rises (falls), the yields on other less liquid assets will follow suit. The steepness of the yield curve then depends on the yield of the longer-term bonds, which are set by the market. But the short end of the curve is the primary determinant of its slope. In other words, the curve steepens mainly because the central bank is lowering the official cash rate, and it flattens mainly because the central bank is raising the official cash rate.

Bond traders link the dynamics of the yield curve to their expectations of the future economic prospects that are expected to influence central bank interest rate policy. It must be remembered that if central banks raise interest rates, then this will tend to cause prices of bonds to fall. This is called a **capital loss**. The prices of bonds with the greatest term to maturity will tend to be affected the most, so longer-term bonds are generally subject to the greatest risk of capital loss. For this reason, there may be a link between inflation expectations, expectations of central bank policy, and prices and yields on longer-term bonds.[1]

In summary, there are three shapes that the yield curve can take:

- **Normal** – Under normal circumstances, short-term bond rates are lower than long-term rates. The central bank attempts to keep short rates down to keep levels of activity as high as possible and bond investors desire premiums in longer-term maturities to protect them against capital losses. Thus, the yield curve is upward sloping, as in the case shown for the US in Figure 10.1.
- **Inverted** – Sometimes, short-term rates are higher than long-term rates and the yield curve is said to be inverted. When the economy starts to overheat, the expectations of rising inflation that might induce the central bank to raise its target interest rate lead to higher bond yields being demanded on assets with longer-term

Figure 10.1 US Treasury yield curve (3 February 2016)



Source: Authors' own. Data from Daily Treasury Yield Curve Rates, Resource Center, US Department of the Treasury (https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/default.aspx).

maturities. The central bank might respond to the building inflationary pressures by raising short-term interest rates sharply. Although bond yields might rise, the significant tightening of monetary policy causes short-term interest rates to rise faster, resulting in an inversion of the yield curve. The higher interest rates may then lead to slower economic growth.

- **Flat** – A flat yield curve is seen most frequently in the transition from positive to inverted and vice versa. As the yield curve flattens, the yield spreads drop considerably. A yield spread is the difference between say, the yield on a one year and a ten year bond. What does this signal about the future performance of the economy? A flat yield curve can reflect a tightening monetary policy (short-term rates rise). Alternatively, it might depict a monetary easing after a recession (easing short-term rates) so the inverted yield curve will flatten out.

Movements in the yield curve are thus closely watched by economists due to the information that they convey about the general health of the economy, possible central bank interest rate adjustments, and inflationary expectations in the non-government sector.

BOX 10.2 THE ORTHODOX APPROACH TO NOMINAL INTEREST RATE DETERMINATION: THE FISHER EFFECT

One risk in holding a fixed coupon bond with a fixed redemption value is purchasing power risk.

Orthodox economists who adopt the loanable funds approach to interest rates believe that most people would prefer to consume now rather than later. To encourage forgone consumption now, a yield on savings must be provided by markets. The yield is intended to allow a person to consume more in the future than has been sacrificed now. But if the prices of goods and services increase in the meantime, then inflation could completely wipe out any gain in real consumption, so that the real interest rate is zero.

Consider a person who invests in a one year $1,000 coupon treasury bond with an expected single coupon payment of $100. The individual will expect to get $1,100 on the redemption date.

Assume that over the holding period, prices rise by ten per cent. At the end of the year, a basket of goods that previously cost $1,000 would now cost $1,100. In other words, the investor is no better off at the end of the year as a result of the investment. The nominal yield has been offset by the price inflation. Orthodox economists believe that investors are motivated by 'real' returns, not by nominal returns. This is because they view the decision to invest as coming from consumers who choose whether to consume now or to consume in the future, with consumption taking the form of real goods and services. If such savers do not take account of inflation, their future real consumption will be less than they desired.

Orthodox economists propose that the nominal interest rate must equal a real interest rate plus expected inflation. The real interest rate is supposed to be the market-determined real return that will equate the saving supply of funds with the investment demand for funds. It is thus a real equilibrium interest rate. However, as contracts are written in nominal terms, that is, in terms of nominal interest rates, the nominal rate must include compensation for the expected inflation rate. This addition to the real rate as inflation expectations rise is called the Fisher effect, named after the American economist Irving Fisher, who identified this relationship in the 1930s. Many market participants believe this applies to bond markets, and there is a strong belief that nominal yields are adjusted by markets to preserve purchasing power.

Purchasing power risk increases as the maturity lengthens. This is one reason many economists believe that longer maturity rates will generally be higher. The market yield is equal to the real rate of return required plus compensation for the expected rate of inflation. If the inflation rate is expected to rise, then market rates will rise to compensate. In this case, we would expect the yield curve to steepen, given that the Fisher effect will impact more significantly on longer maturity bonds than at the short end of the yield curve.

10.4 What Do Banks Do?

The neoclassical view: the money multiplier

In most textbooks, banks are presented as financial intermediaries that take in deposits, hold a small fraction of these in the form of reserves, and lend out the remainder. The causality is from deposits to reserves to loans. If each bank follows these principles in making loans, aggregate lending expands through the 'deposit or money multiplier'. For the moment assume that all banks are required to maintain a ratio of reserves to deposits of ten per cent. This might be to enable them to readily respond to a loss of reserves resulting from spending by customers (on goods and services, say) whose sellers bank elsewhere, or customers seeking to hold additional cash.

This is how the neoclassical school of thought describes the operation of the **money multiplier**:

i) Assume that a customer deposits $100 in Bank A;
ii) Bank A retains $10 of reserves to conform to the required reserves-to-deposit ratio of ten per cent. To expand its loan portfolio and increase profits, the remaining $90 is loaned to a customer whose deposits rise by $90;
iii) The customer spends these deposits and the recipient of the funds (seller) deposits $90 in Bank B;
iv) Bank B then lends $0.9 \times \$90 = \$81$ (keeping ten per cent, that is, $9 as additional reserves, as required) to a customer to finance their expenditure and so on.

At each stage the amount lent and then spent diminishes. It can be readily shown that if this was the way the banking system operated, then $900 of additional loans are created. With the initial new deposit, this means that deposits have risen by a total of $1,000 and are 'backed' by $100 of reserves, thereby conforming to the required ten per cent ratio.

This example is what the mainstream textbooks call a **fractional reserve banking system**. It purports to explain how banks create money, which increases the M1 money supply due to the increase in current deposits. In terms of the initial deposit of $100, the multiplier is 10, which is the inverse of the required reserves-to-deposit ratio of 0.1. A smaller money multiplier results if the non-government sector chooses to hold more cash when credit is created.

Note that no individual bank 'creates money' in this example, but the system as a whole 'multiplies' the initial deposit of $100 into $1,000. At each step, each bank simply lends out 90 per cent of the deposit it has received, keeping ten per cent as reserves. According to mainstream textbooks, the 'magic' results from fractional reserve banking. The larger the fraction of a deposit that must be retained as reserves, the smaller the multiplier effect. Following this logic, if the reserve ratio were zero (no reserves held against deposits), the banks would create an infinite amount of deposits after the deposit of just one dollar.

The standard textbook example is typically assumed as a ten per cent ratio, so that students can readily calculate a money multiplier equal to ten! On 12 April 1992, the US Federal Reserve Bank, for the first time in history, set the required reserve ratio on demand deposits at the magical ten per cent, making theory appear to coincide with reality. But that coincidence did not make the theory correct. As we will see next, the money multiplier as a description of modern banking is a myth, and bears no relation to how banks operate in the real world.

To summarise the dominant neoclassical view, banks are conceived as being financial intermediaries that maximise profits. They take in deposits to build up reserves so that they can then on lend the deposits at a higher interest rate. However prudential regulations require that they maintain a minimum reserve-to-deposit ratio. The fractional reserve requirements mean that the resulting credit creation process is finite.

In addition, many economists still believe that the monetary base, which consists of bank reserves and cash held by the non-government sector, is under the control of the central bank. Thus, by controlling the size of the monetary base and setting the required reserve ratio, the central bank is considered to be able to control the size of the money supply or the quantity of money.

Thus in the neoclassical narrative, the money supply is considered **exogenous** and determined by the central bank. This is an important claim because it has underpinned arguments that central banks can cause inflation by allowing the money supply to grow too quickly. From this follows the Quantity Theory of Money's (QTM) policy recommendation that the central bank can fight inflation by slowing money growth. As we will see in Chapter 20 (and analyse in Chapter 23), the QTM is a flawed conception of the inflation generation process. We will also demonstrate that the central bank does not have the capacity to control the money supply in a normally functioning money system.

The implication of the operation of the money multiplier is that a bank would forgo profitable loan opportunities if it did not have sufficient reserves to enable additional credit creation. Some allowance is made for discretion: the deposit multiplier is claimed to be a function of interest rates and interest rate differentials, bank preferences regarding their holdings of excess reserves, and also public preferences regarding their holdings of cash, as noted, and time deposit and demand deposit ratios. However, as Brunner (1968) 'demonstrated', these factors are of only minor importance.

MMT representation of the credit creation process

The neoclassical characterisation of the credit creation process, which is driven by fractional reserve requirements, is not an accurate depiction of the way banks operate in a modern monetary economy characterised by a fiat currency and a flexible exchange rate.

In the real world, the business of banking is complicated but is, in some respects, similar to that of other profit-seeking firms. Like these other firms, banks seek to earn profits and thereby generate returns for shareholders. Making loans secures profits, as long as the banks are paying a lower rate of interest on the funds that they borrow than they receive from their customers who take out loans.

First, a necessary condition for credit creation is that there are non-bank firms and/or households who are seeking loans to finance their planned spending on goods, services or assets. Second, some of these entities must be considered creditworthy by the banks, so that there is a high probability that the loan will be repaid in full. What constitutes creditworthiness varies over the business cycle and lending standards tend to become more lax in boom times as banks chase market share. Third, the banks must anticipate that there is profit to be made by making these loans, as described above.

Banks make loans independently of their reserve positions (that is, their holdings of reserves, relative to their liabilities). After originating loans they will borrow additional reserves if required by law or for clearing purposes.

Bank managers generally neither know, nor care, about the aggregate level of reserves in the banking system. Certainly, no loan officer ever checks the individual bank's reserve position before approving a loan. Bank lending decisions are affected by the price of reserves and expected returns, not by reserve positions. If the spread between the rate of return on an asset (a security or a loan) and the cost of borrowing reserves is wide enough, even a bank that is already deficient in reserves will purchase the asset or make a loan and cover the reserves needed by purchasing (borrowing) reserves in the **interbank market**. The interbank market connects the banks which lend reserves to and borrow reserves from each other when needed.

The important point is that when a bank originates a loan to a firm or a household, it is not lending reserves. Bank lending is not easier if there are more reserves, just as it is not harder if there are less. Bank reserves do not fund money creation in the way that is claimed in the money multiplier and fractional reserve deposit story; banks do not wait for deposits to come in before they make loans.

The main difference between banks and other types of firms involves the nature of the liabilities. Banks 'make loans' by purchasing the IOUs of 'borrowers'. This results in a bank liability, usually a demand deposit, at least initially, that shows up as an asset of the borrower. Thus, a customer of a bank who secures a loan is simultaneously a 'creditor' of the bank, due to holding a demand deposit, but also a 'debtor' to the bank. These creditors will almost immediately exercise their right to use the newly created demand deposits as a medium of exchange for purchases of goods and services, or assets. Bank liabilities (bank deposits) are used by households and non-bank firms for transactions in the form of cheques or transfers. Customers can also redeem demand deposits at par (dollar for dollar) against fiat money (which is guaranteed by the government) to enable cash to be used for purchases or making payments that are due. The government will also accept some kinds of bank liabilities in payment of taxes.

In turn, bank reserves are used for payment (or interbank settlement) among banks and for payments made to the central bank. Thus, when bank 'creditors' draw down their demand deposits, by either spending or choosing to hold more cash, a corresponding loss of reserves for the individual bank results. The bank may then either sell an asset or increase its liabilities (borrowing additional reserves) to cover the loss of reserves.

The interbank market (called the federal funds market in the US) functions to shuffle the reserve balances that the member (private) banks keep with the central bank to ensure that each of these banks can meet its reserve targets, which might be simply zero balances at the end of a specified period of time (that for simplicity, we could assume is a day). In aggregate, however, such activities only shift reserves from one bank to another. If more reserves are needed in total, they must be supplied by the central bank.

Far from waiting for deposits before they create loans, banks in the real world expand their balance sheets by lending as described below.

Loans create deposits

Loans create deposits that are then backed by reserves after the fact. The process of extending loans (credit), which creates new bank liabilities, is unrelated to the reserve position of the bank. In the pursuit of profit, banks take applications from creditworthy customers who seek loans and assess them according to the verity of the application, although in the lead-up to the Global Financial Crisis of 2008, the validation process became very lax.

The only thing that constrains the bank loan desks from expanding credit is a lack of creditworthy applicants, which can be due to banks raising the qualifying standards in times of pessimism, or can occur if creditworthy customers are loath to seek loans because of future uncertainty.

The major insight is that any balance sheet expansion that leaves a bank short of the required reserves may affect the return it can expect on the loan. This is a consequence of the 'penalty' rate the central bank might exact through the discount window (the central bank facility for lending to banks in need of reserves) should the bank fall short of the reserves it requires at the end of the day to cover the claims on it. However, it will never impede the bank's capacity to make the loan in the first place. It is thus quite wrong to assume that the central bank can influence the capacity of banks to expand credit by adding more reserves into the system. We will address this proposition in more detail in Chapter 23.

Banks do not loan out reserves

A corollary of the 'loans create deposits' insight is that banks do not loan out reserves, which raises the question of what role do bank reserves actually play?

Banks must hold reserve balances with the central bank as part of the **payments system**. The reserves are used to make interbank payments. Each day millions of transactions are reconciled (settled) through these interbank payments. For example, cheques drawn on Bank A and deposited at Bank B will see funds transferred from Bank A's reserve balances to those of Bank B.

If a particular bank finds itself short of the quantity of reserves necessary to resolve all the daily claims against it, then it can first try to borrow reserves from other banks that might have excess reserves in relation to their requirements on that particular day. But, as we will see in Chapters 20 and 23, an overall shortage (or excess) of reserves across the banking system must be rectified by the central bank which provides reserves to banks (in the case of a shortage) or may drain them from the system in the case of an excess. This central bank intervention is what we refer to as its liquidity management role and allows the bank to manage the overall level of reserves so that it is consistent with its interest rate target. For example, if on any particular day there is an excess of reserves (over and above the quantity required to settle transactions) and the central bank does not offer any competitive return on them, banks holding those excesses will try to loan them out overnight, which has the effect of driving down the short-term interest rate. The central bank must drain those reserves (by selling government bonds to the banks in return for debits to the reserve accounts) to ensure the overnight interbank interest rate remains equal to its desired policy (target) rate. We will learn more about this in Chapter 23.

Endogenous money

We have stated that unlike the story presented in neoclassical textbooks, in the real world the central bank cannot control the money supply. In other words, the money supply is **endogenous money** in the sense that the supply of bank money is determined 'endogenously' by the demand for bank loans, plus the willingness of banks to lend (which gives rise to the creation of deposits). The neoclassical theory erroneously believes that the money supply is exogenous and determined through the money multiplier interacting with the monetary base, which neoclassicists believe to be under the control of the central bank.

The demand for bank loans is determined by the spending decisions of private economic agents (including decisions regarding asset purchases). These can be affected, but only very indirectly, by the loan rate of interest. Banks supply loans only because someone is willing to 'borrow' bank money by issuing an IOU to banks. This means that the interest rate cannot be determined by the supply of and demand for loans since supply and demand are not independent. Rather, banks are price setters in short-term retail loan markets. They then meet the demand for loans with some quantity rationing at that price. In other words, some requests for loans are refused, even where aspiring borrowers claim to be willing and able to pay the going interest rate.

There can be several reasons for such quantity rationing of large segments of the population. Banks might worry about the default risk of some borrowers but might not be able to raise interest rates sufficiently to cover the default risk. Quantity rationing is then superior to price rationing, that is, raising the interest rate charged to some borrowers. Also, banks probably have better information than do borrowers about default risks. For example, the borrower who wishes to open a new restaurant might not have accurate information about bankruptcy rates in the industry or might simply be overly optimistic. On the other hand, banks can never know the future, so must operate based on rules of thumb (for example, informal rules that restrict loan size). Some quantity rationing can even be irrational, perhaps discriminatory, because banks have traditionally forgone certain kinds of loans or are reluctant to lend to certain groups in the community. The key point is that the supply of loans does not simply adjust to the demand for loans at some interest rate.

The short-term retail interest rates can be taken as a mark-up over short-term wholesale interest rates. Exactly what determines the mark-up (and whether it is variable) is controversial, but not important to our analysis here (see Moore, 1988).

Wholesale interest rates, finally, are under the influence of central bank policy. Individual banks use wholesale markets to rectify a mismatch between retail loans and deposits. Most banks will not be able to exactly reconcile their retail loans and deposits. Some banks will be able to make more retail loans than they can retain in deposits and thus suffer a loss of reserves, while others will find fewer loan customers than depositors, so they will have a surplus of reserves. Banks then use wholesale markets to either 'purchase' reserves by issuing wholesale liabilities (for example, negotiable, large denomination certificates of deposit (CDs) or by borrowing central bank funds), while surplus banks will sell their excess reserves.

As discussed above, the central bank sets the overnight interbank rate. This rate then determines other short-term wholesale rates (mainly by marking up, but also by marking down) through arbitrage.

Summary

The neoclassical position is that banks leverage (create credit) when provided with new deposits, but are constrained by fractional reserve requirements. Since the central bank is supposedly able to control the monetary base, it is claimed that the central bank can control the supply of money.

Reflecting what happens in the real world, MMT demonstrates that the central bank cannot control the monetary base, because monetary policy is conducted by the central bank setting a target interbank rate and providing the right level of reserves to the banking system so that banks lend to and borrow from each other at this target rate (for more details, see Chapters 20 and 23). Second, a bank is not constrained by its reserve position in deciding whether to make a loan to a particular customer. If the customer appears creditworthy and the loan is profitable to the bank, it will make the loan and then acquire sufficient reserves by borrowing from other banks or the central bank. Thus, in contrast to the neoclassical position of deposits driving loans, MMT shows that loans drive deposits. Third, taken together, the growth in the broad money supply is driven by the demand for loans and the monetary base adjusts to the pressures that the endogenous monetary growth places on the central bank in its quest to sustain a particular policy interest rate. Hence the supply of money is determined endogenously while the price of money (short-term interest rate) is determined exogenously by central bank policy.

An example of a bank's credit creation: a balance sheet analysis

The balance sheet of a typical bank looks like that in Figure 10.2.

The entries on the balance sheet are the cheque and savings accounts. Note that they are the IOUs of banks, and hence appear as liabilities. The bank promises to convert deposits in a cheque account (and deposits in most savings accounts) into cash on demand. Banks hold financial assets in the form of loans to customers and securities (that is, treasury debt and other financial assets).

Firms in general and banks should have positive net worth, which is the difference between total assets and total liabilities. Total Assets in the left-hand column will balance with the items in the Liability column, because the latter includes net worth.

The following simplified series of balance sheets will clarify the process of credit creation by Bank A. Let us assume that Bank A starts with the very simple balance sheet in Figure 10.3, which is expressed in terms of stocks.

Figure 10.2 A typical bank balance sheet

Assets	Liabilities
Advances (loans)	Cheque accounts
Securities	Savings accounts
Reserves	Other liabilities
Other assets	
	Net worth

Figure 10.3 Bank A initial balance sheet

Assets		Liabilities	
Building	$200		
		Net worth	$200

Its owners have raised capital and bought the building. The owner's equity or net worth is equal to the value of the building that they have purchased. Bank A has not engaged in any banking activity yet.

Now a customer comes into the bank and says that they would like to borrow $200 to finance the purchase of a car. The bank checks their creditworthiness by asking for income tax returns, proof of assets, credit history, and so on. If the customer is approved, then the bank's balance sheet takes the form shown in Figure 10.4.

The bank just created $200 of money entries (deposits in the cheque account of the customer in return for the customer's IOU, or promise to pay $200). The bank's total assets, liabilities plus net worth, are now $400.

Before we move on to the customer's spending of their deposit, let us examine this balance sheet carefully.

Where did the bank get the money entry it created?

- A cheque account was created *ex nihilo*, that is, from nothing, by entering a number (200) in a computer ledger on behalf of the borrower. In the past, banks could also issue their own banknotes, but generally only central banks can do that now.
- The bank did not need any prior deposits, or any cash in its vault. In fact, the bank did not have any cash in its vault, nor did it have any deposits in its account at the central bank in this simplified example.
- The bank is not lending anything it has, it just creates money entries (that is, bank deposits), at will.
- Those money deposits or entries are its liabilities/IOUs.
- By creating those bank IOUs, the bank promises to:
  - Convert deposits into cash on demand;
  - Accept any of those IOUs in payment of debts owed to the bank.

The cheque account is just a legal promise to convert to cash on demand, and to accept payment in the form of the bank's own IOUs. The bank does not have to have any cash now.

The success of the banking operation (lending by accepting an IOU, and the creation of a demand deposit) depends on:

- The capacity of the customer to repay, that is, their creditworthiness. If they have problems in making timely payments on their debts, this affects the value of the bank's assets and its own income inflows and ultimately affects the net worth of the bank, the bank's capital ratio, and the shareholders' return on equity.
- The bank's capacity to acquire reserves at low cost if:
  - The customer wants to withdraw cash;
  - The bank needs to pay debts to other banks through an interbank settlement following the customer's spending (see below);
  - The bank needs to settle tax payments made by the customer to the government.

Figure 10.4 Bank A balance sheet showing loan

Assets		Liabilities	
Loan to customer	+ $200	Cheque account of customer	+ $200
Building	$200		
		Net worth	$200

If these conditions are not satisfied the bank gets into trouble; it can become insolvent or illiquid. Insolvency means that the bank's net worth falls to or below zero; illiquidity means that it cannot meet cash withdrawals or clearing. Thus, even though banks can create unlimited amounts of money

Figure 10.5 Bank A balance sheet showing purchase of car

Change in Assets		Change in Liabilities	
		Cheque account of the customer	−$200
		Reserves due to Bank B	+$200

Figure 10.6 Bank B balance sheet showing purchase of car

Change in Assets		Change in Liabilities	
Claim on Bank A reserves	+$200	Cheque account of car dealer	+$200

deposits, they have no incentive to do so because they may become unprofitable.

What happens if the customer now pays $200 to a car dealer who has a bank account at Bank B? The balance sheets of Banks A and B look like Figures 10.5 and 10.6, respectively. (Note that we are now just dealing with the change in assets and liabilities rather than their levels.)

Bank A's liabilities in the form of the customer's cheque account have dropped by $200 through the purchase of a car, but the transaction is not confined to the reduced balances in the customer's account at Bank A and the increased balances of the car dealer at Bank B. Bank A now owes Bank B $200 and needs reserves to settle this debt, but does not have reserves. Where does it get the reserves?

The banks are required to keep reserve accounts at the central bank. These reserves are liabilities of the central bank and assets of the banks, and function to ensure that the payments (or settlements) system functions smoothly. That system relates to the millions of transactions that occur daily between banks as cheques are tendered by citizens and firms and other bodies. Without a coherent system of reserves, Bank A could easily find itself unable to fund Bank B's demands based on the cheque drawn on the customer's account and presented at Bank B by the car dealer.

Bank A will get the reserves from the source that is the least costly. It may sell assets, but in our example, Bank A only has a building so it would be very costly to get reserves that way. Bank A could sell bonds if it had any, or it could borrow reserves from other banks (domestic or foreign) or the central bank. A common way to get the reserves is to borrow from the central bank, which is the monopoly supplier of reserves. Figure 10.7 documents the latest change to Bank A's balance sheet, associated with obtaining these reserves, while Figure 10.8 shows the changes to the central bank's balance sheet.

Now that Bank A has the reserves it can settle its debt with Bank B. The changes to the two banks' balance sheets are shown in Figures 10.9 and 10.10.

The debt between the two banks has been settled. The final balance sheet of Bank A looks like Figure 10.11.

Bank A makes money as long as the interest it receives on the loan to the customer is higher than the interest it pays to the central bank on the reserves.

Figure 10.7 Bank A balance sheet showing loan from central bank

Change in Assets		Change in Liabilities	
Reserve	+$200	Debt to central bank	+$200

Figure 10.8 Central bank balance sheet showing loan

Change in Assets		Change in Liabilities	
Reserve loan to Bank A	+$200	Reserve	+$200

The balance sheet of Bank B is shown in Figure 10.12. We assume that Bank B had reserves prior to the cheque account of the car dealer being increased by the sale of the car to the customer.

The final balance sheet of the central bank after all transactions is shown in Figure 10.13.

Note that none of these operations involved any transfer of physical cash. It was all bookkeeping entries conducted digitally through computer networks.

Also, note that we have only shown the assets and liabilities directly related

Figure 10.9 Bank A balance sheet showing settlement of debt

Change in Assets		Change in Liabilities	
Reserves	−$200	Reserves due to Bank B	−$200

Figure 10.10 Bank B balance sheet showing settlement of debt

Change in Assets		Change in Liabilities
Claim on Bank A	−$200	
Reserves	+$200	

to our example. Of course, private banks and the central bank have many other assets and liabilities, as well as net worth on their balance sheets.

In practice, the central bank will usually not advance reserves to the bank directly in the form of an unsecured advance; instead it will ask for collateral (usually a treasury security) in exchange and will provide funds for less than the value of the collateral. So, if Bank A has a $300 bond, it surrenders it to the central bank in exchange for reserves. The central bank might only give the bank $285 if the discount rate is five per cent. The discount rate is one way in which the central bank can try to limit credit creation in the economy.

Figure 10.11 Bank A final balance sheet

Assets		Liabilities	
Funds advanced to customer	$200	Debt to central bank	$200
Building	$200		
		Net worth	$200

Figure 10.12 Bank B final balance sheet

Assets		Liabilities	
Reserves	$200	Cheque account of car dealer	$200

Figure 10.13 Central bank final balance sheet

Assets		Liabilities	
Reserve loan to Bank A	$200	Reserves	$200

Conclusion

It is insufficient and misleading to think of modern banks as 'intermediaries' that take in deposits and then lend most of them out, while retaining some fraction as reserves. Instead, we should think of banks as making loans (accepting the IOUs of borrowers) and then creating demand deposits that the borrowers can use to finance their spending. Banks mostly use reserves for clearing, that is, for settling payments with other banks, the central bank, and the treasury, and at the ATM (when cash is withdrawn). Banks obtain reserves as needed either by borrowing

them from other banks or through creation of reserves by the central bank. We will explain in more detail how, and why, central banks accommodate the demand for reserves in Chapter 20.

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Endnote

1. Orthodox economists propose that the nominal interest rate must equal a real interest rate plus expected inflation. The real interest rate is supposed to be the market-determined real return that will equate the saving supply of funds with the investment demand for funds. It is thus a real equilibrium interest rate. However, as contracts are written in nominal terms, that is, in terms of nominal interest rates, the nominal rate must include compensation for the expected inflation rate. This addition to the real rate as inflation expectations rise is called the Fisher effect (see Box 10.2). Many market participants believe this applies to bond markets. There is a strong belief that nominal yields are adjusted by markets to preserve purchasing power.

Visit the companion website at www.macmillanihe.com/mitchell-macro for additional resources including author videos, an instructor's manual, worked examples, tutorial questions, additional references, the data sets used in constructing various graphs in the text, and more.