

PART

1

FINANCIAL MARKETS

COPYRIGHTED MATERIAL

Markets and Players

AIMS

- To discuss the key players in financial markets.
- To introduce the concept of fair value and the efficient markets hypothesis.
- To examine the role played by arbitrageurs, speculators and hedgers.
- To introduce market risk and credit risk.



INTRODUCTION

The real wealth of the economy is in tangible assets such as land, buildings and machinery and the human capital that can help produce goods and services in the future. Financial markets and institutions channel funds to where they are likely to be most productive – they facilitate the process of real investment by moving funds between surplus and deficit units, which may be individuals, firms or the government.

Finance is the antithesis of Polonius’s advice to his son, in Shakespeare’s *Hamlet*, of ‘neither a borrower or lender be’. Individuals benefit from consuming goods and services, which are primarily produced by firms but also by the government sector (e.g. education, health and transport facilities in many countries). To produce ‘goods’, firms and the government often have to finance additional capital investment expenditures by borrowing funds. In general, individuals (as a group) are net savers and are in a position to lend funds, while firms are net borrowers; the government may either be a net borrower or a net lender.

Just as there are a wide variety of goods to purchase, there are also a wide variety of methods of borrowing and lending money, to suit the preferences of different individuals and institutions. When you ‘walk around’ alternative supermarkets, department stores and the Internet, you face a bewildering array of merchandise. Some sellers try as far as possible to cater for the ‘mass market’ (e.g. Wal-Mart, Marks & Spencer), others cater for more idiosyncratic tastes and styles (e.g. Jean-Paul Gaultier, Versace), while some sell rather shoddy goods. (There are no examples we can name here, because of possible litigation – but you will have your favourites.) Similarly, the markets for funds cater both for the relatively homogeneous ‘mass market’ but also try to tailor ‘products’ to individual requirements.

Brand names and reputation effect can be important, when selling goods and also when providing financial services and trading assets. ‘Brand names’, like the London Stock Exchange, the New York Stock Exchange (NYSE) and the Chicago Board of Trade, as well as financial intermediaries such as Merrill Lynch, Morgan Stanley, Citigroup, Salomon Brothers, Goldman Sachs and so on, are key institutions in transferring funds between different ‘players’ in the financial marketplace. The financial services of some providers have a good reputation, while some other financial products are on a par with ‘shoddy goods’ – junk bonds or bonds of certain emerging economies come to mind here. But that’s not to say that these do not provide ‘value for money’ – they may be ‘high risk’, but they may also provide high returns to compensate for such risk.

All of the issues discussed in this opening chapter will be considered in greater depth in subsequent chapters. Nevertheless, we think it is useful to try to take in some of the ‘big picture’ before getting immersed in the finer details of the plethora of financial instruments and players in today’s modern economies.

1.1 MARKETS

Financial markets facilitate the exchange of financial instruments such as stocks, bills and bonds, foreign exchange, futures, options and swaps. These assets are the means by which ‘claims’ are transferred from one party to another. Frequently, financial assets involve delayed

receipts or payments and they therefore also transfer funds across time (e.g. if you purchase a bond you hand over cash today, but the payouts from the bond occur over many future periods).

Financial instruments are generally referred to as securities. Securities differ in the timing of payments, whether they can be readily sold prior to maturity in a secondary liquid market (e.g. via the stock exchange) and in the legal obligations associated with each security (e.g. bondholders must be paid before equityholders). Many securities are ***readily negotiable claims***. *Readily negotiable* means that the owner of the security may sell it quickly and with low transaction costs; then the market is said to be ***liquid***.

Some financial instruments (e.g. stocks and bonds) derive their value purely on the basis of the future performance of the issuer (e.g. the firm). A financial instrument has no intrinsic value—it is usually a piece of paper or an entry in a register. In an extreme case, if the issuer ceases to make payments on the instrument (i.e. the issuer *defaults*), the instrument may become worthless.

Other financial instruments known as **derivatives** (i.e. forwards, futures, options, swaps) have value because their payoff depends on the price of other financial assets (e.g. stocks, bonds) or real assets (e.g. oil, silver, agricultural products).

Trading in financial instruments may take place face to face, for example pit trading on the NYSE and trading in futures contracts on the Chicago Mercantile Exchange (CME). Trading in some markets takes place via telephone with the aid of computers to track prices (e.g. the foreign exchange or FX market). There is also a general move towards settling transactions using only computers (i.e. non-paper transactions).

A ‘non-marketable instrument’ is one that is not traded in a secondary market like the NYSE. It is usually a financial agreement between two (or more) parties with the arrangement being held to maturity of the contract (e.g. a term loan or deposit in a bank) – these are **over-the-counter** (OTC) agreements. A bank term loan to a firm is a non-marketable OTC instrument, since neither the bank nor the firm can (in general) *easily* shift this specific contract to other parties. Clearly, this ‘non-marketable’ is a matter of degree. In fact there is a secondary market in ‘bundles’ of bank loans in the US and bank loans can also be securitised, but these possibilities are quite costly (see Case Study 1.1). Other large OTC markets include the Eurobond market, spot and forward markets in foreign exchange, swaps markets and options’ contracts.

CASE STUDY 1.1 LOAN SALES

In some well-developed financial systems there is a secondary market in buying and selling bank loans. Note that this is different from securitisation, since the loans are directly sold by a bank to another counterparty (e.g. another bank, an insurance company or hedge fund); no new ‘securities’ are created and sold. The loan sales market is most active in the US and grew tremendously in the 1980s as leveraged buyouts (LBOs) financed mergers and acquisitions.

If a bank finances an LBO, for example when a private equity group takes over a large firm, the bank will have a large concentrated loan on its balance sheet. Similarly, banks sometimes lend in specific geographical areas and sectors (e.g. oil loans in Texas). Since the regulatory changes of 1988 (i.e. the 'Basle Accord'), banks have to hold capital (i.e. broadly share capital plus retained profits) equal to 8% of their loan value outstanding, which they consider an expensive form of finance. However, if these loans are sold *without recourse* to a counterparty, then the default risk is transferred to the counterparty and the capital charge on the bank is removed. This encourages loan sales.

These bank loans may be classified as non-distressed (i.e. bid price exceeds 80 cents per \$1 of loans) or distressed (i.e. bid price is less than 80 cents per \$1 of loans or the borrower is in default). The main sellers of these 'bundles' of bank loans are large investment banks (e.g. Merrill Lynch, Goldman Sachs) whose corporate finance departments may have originated the LBO loans in the first place. After selling the loans the original bank may continue to collect the interest payments on the loans (for a fee) and may also earn an origination fee for setting up the initial loan agreements.

The buyers of loan sales are large banks and hedge funds who speculate on the change in market value of such loans, as the credit default risk of the constituent companies alters over time. They hope to influence the outcome of any restructuring deal in their favour. These 'loan sales' can be traded in the secondary market, but are rather like trading in *illiquid* junk bonds. The illiquidity arises because it can often take up to three months to complete a loan sale and many deals fall through before completion because of legal problems (or because the market price moves below the initial offered price in the loan sale deal). Clearly, this market is less liquid than if the loans were fully securitised (see later in the chapter).

1.2 PLAYERS

Funds are channelled from individuals to the corporate sector and between individuals via financial intermediaries such as banks, savings and loan associations (building societies in the UK), pension funds and insurance companies. Why have financial intermediaries taken up this role in preference to direct lending from people to companies (and the government)? The main reasons involve transactions, search and information costs and risk spreading.

Banks take mainly short-term deposits from individuals and firms and on-lend them as bank loans. They can assess the creditworthiness of borrowers and a diversified loan portfolio reduces credit (default) risk. Also, by taking advantage of 'the law of large numbers' banks can hold fewer low-yield 'cash balances' and pass on this cost saving in the form of lower interest rates to borrowers or higher interest rates to depositors. For example, the daily *net* flow of cash out of a large commercial bank is much less than the 'over-the-counter' *gross* flow because a large number of surplus and deficit units use the same branch on any one day. In contrast, a small operator would have to hold a high level of 'cash reserves'. This is part of the reason financial intermediaries can engage in **asset transformation**. That is, they

borrow ‘short’ and lend ‘long’. There are *economies of scale* for banks in terms of providing the infrastructure to administer accounts, to advertise and monitor their borrowers and lenders.

Individuals often want to hold deposits that pay variable interest rates while borrowers often prefer to borrow at fixed interest rates. If a financial intermediary is a floating rate payer (on its deposits) and receives fixed payments on its loans, then it is subject to interest rate risk as it will lose income if deposit rates rise (since it cannot alter its fixed loan rate). However, it can use the derivatives market to remove (hedge) this risk by using interest rate swaps.

Investment banks such as Goldman Sachs or Merrill Lynch also advise corporations on raising finance via bond issues and stock issues. If it is the first time the firm has gone to the capital market then the new issue is known as **an initial public offering (IPO)**. The optimal mix of debt and equity finance may be important in the overall cost of capital for the firm. Investment banks also provide legal and financial expertise in mergers and acquisitions – in principle this is how inefficient managers are replaced by more efficient managers and is the **market for corporate control**.

Governments borrow short-term money by issuing Treasury bills (T-bills) and obtain long-term finance by issuing Treasury bonds (T-bonds) with maturities up to about 30 years. The rate of interest for different maturities is known as the yield curve. Central banks influence short-term interest rates by purchasing or selling T-bills in the market; short-term interest rates then influence long-term rates. The graph of the relationship between short-term and long-term rates of interest is known as the **yield curve** and is usually upward sloping – for example, the annual interest rate you receive on money lent for 10 years is usually higher than the annual rate of interest on money lent for 1 year. Theories of why the yield curve takes on particular shapes are known as the **term structure of interest rates**.

Portfolio diversification means that if you invest in a large number of ‘risky’ assets (e.g. stocks) then the ‘risk’ on the whole portfolio is much less than if you hold just a few stocks. So financial intermediaries ‘pool’ the funds of many individuals and purchase a diversified portfolio of financial assets, which is held on behalf of the individual investors.

Mutual funds (unit trusts in the UK) are financial intermediaries who take in funds from investors. They purchase a portfolio of financial assets (e.g. stocks and bonds) on behalf of the investors and the mutual fund then issues its own shares (units) against this portfolio. Since each share *in the fund* is a claim on income from a number of different securities, mutual funds allow investors to hold a diversified portfolio at low (administrative) cost. Mutual funds are **open-end** funds – the managers of the fund agree to repurchase an investor’s shareholding in the fund, at a price equal to the market value of the underlying securities (called the *Net Asset Value*, NAV). When investors ‘cash in’ their shares in the fund, its managers will sell off some of the underlying assets in the fund at their market value (NAV) and use the proceeds to redeem the investors’ shares in the fund. Any accrued dividend income from the underlying shares in the fund is either paid out (distributed) to the investor or can be reinvested in other stocks by the managers – and the investor will then hold more shares (units) of the fund.

In contrast, **closed-end** funds (i.e. investment trusts in the UK, but not in the US) have no obligation to repurchase an investor’s shares in the fund. Shares of closed-end funds are quoted on a stock exchange and are traded in the open market just like the shares of a company.

If an investor in a closed-end fund wants to ‘cash in’ her holdings, then she must sell the shares of the fund on the stock market for whatever price she can obtain – she cannot sell her shares back to the managers of the closed-end fund. The NAV of a closed-end fund is the market value of all the shares held by the fund. But the *market price* of shares of the fund can differ from the net asset value of the underlying shares. Often closed-end funds sell for much less than their net asset value. This ‘discount’ cannot be accounted for by management fees, bid-ask spreads and so on, and is therefore referred to as a ‘puzzle’ or ‘anomaly’.

Mutual funds provide diversified funds of many different asset classes. There are money market mutual funds that invest in T-bills and commercial bills, equity and bond funds and real estate investment trusts (REITS). Mutual funds are often subsidiaries of large banks and insurance companies (e.g. Morgan Stanley, Citigroup, Merrill Lynch, Legal and General). The investment decisions of a mutual fund are taken by a group of investment managers. Most mutual funds have ‘active’ investment policies; that is, they try to ‘beat the market’, either by buying underpriced shares (**security selection**) or by increasing their exposure to the market when they expect it to rise substantially (**market timing**). There are relatively few mutual funds that have a passive investment strategy and track a broad market index (e.g. the S&P 500 index).

Hedge funds are also pooled investments, but they have far more freedom than mutual funds in the types of asset in which they can invest and the types of trades they can undertake.

Insurance companies take funds from the personal sector in the form of life assurance, pension payments and other insurance policies, while pension funds collect payments from defined benefit (salary) and defined contribution pension schemes. Future payments of pensions are long-term liabilities and pension funds invest in a mixture of government T-bonds, corporate bonds, equities and property, in both domestic and overseas markets. The precise mix of these assets that a pension fund should hold is a source of controversy – particularly after large stock market crashes that can rapidly erode the assets of the fund and may threaten its solvency.

Net inflows into pension funds and insurance companies are often given to the same investment managers who run mutual funds. However, in many countries the proportion of funds one can invest in certain asset classes (e.g. foreign stocks and bonds) is set by law, although such restrictions are gradually being eased in Europe, the US and even in Japan. Recently pension funds, particularly UK funds, have started investing in hedge funds and private equity funds.

Securitisation

Securitisation is the term used for the practice of issuing marketable securities backed by non-marketable cash flows – it has become a very large market in recent years. For example, suppose that a bank has made a series of long-term loans, so the bank has taken on a large amount of credit exposure. One way of reducing this exposure would be to create a separate legal entity known as a *special purpose vehicle* (SPV), into which the loans are placed and therefore are ‘off balance sheet’ for the bank. If the bank gets into financial difficulties with its other activities, the loans in the SPV cannot be claimed by the bank’s creditors. The SPV then issues securities to investors entitling them to the stream of income paid out of the interest payments on the loan – this is **securitisation**. The default (credit) risk on the loans is now

spread among a number of investors, rather than just applying to the bank. The bank continues to collect the interest payments and repayments of principal on the loans (for a fee) but passes these on to the owners of the securities – hence the term *pass-through securities*. For example, if they are home loans to individuals, these securities would be **mortgage-backed securities (MBS)**. In the US, the Government National Mortgage Association (GNMA or Ginnie Mae) bundles up home mortgages into relatively homogeneous ‘pools’, for example \$100m of 6%, 20-year conventional mortgages. GNMA then issues, say, 10,000 MBS, so each purchaser of an MBS has a claim to \$10,000 of these mortgages and is entitled to receive 1/10,000 of all the payments of interest and principal. MBS are marketable and highly liquid. From the investors’ point of view, purchasing such securities provides them with a higher yield than government bonds and allows them to take on exposure to the (mortgage) sector. But they can at any time sell the MBS in the secondary market (at whatever the current market price happens to be).

Other **asset-backed securities** include marketable securities whose cash flows depend on corporate loans by banks, car loans (e.g. VW, General Motors), credit card receivables (most large banks), music royalties (e.g. Bowie and Rod Stewart), telephone call charges (e.g. Telemex in Mexico) and football season tickets (e.g. Lazio, Real Madrid).

Investors in asset-backed securities share in the default risk that arises if the underlying borrowers default on their payments. If you hold a diversified portfolio of asset-backed securities then the default risk depends on the correlations between the default risk for the different categories of asset-backed securities (e.g. whether lots of people who owe credit card debt default on some of their payments at the same time as people who owe money on car loans). A slightly different way of ‘bundling up’ the default risk is to issue securities where the investor can decide whether she is willing to take the ‘first hit’ from any defaults or, being rather less risk tolerant, is only willing to take the hit on the last few debtors who default. This type packaging of credit risk is known as a collateralised debt obligation (CDO); see Case Study 1.2.

CASE STUDY 1.2 COLLATERALISED DEBT OBLIGATION (CDO)

CDOs are a way of ‘repackaging’ credit risk and creating ‘tranches’ of debt that have different payments on default. In this way, debt of average risk can be split into bundles of high- to low-quality debt. A pool of bank loans or corporate bonds, each with a different default risk, are placed in a portfolio, where the assets have (say) an average promised yield of 8.5%. This portfolio of assets is placed in a special purpose vehicle (SPV), an entity independent of the issuers of the bonds or loans.

The credit risk on these assets is then split into (say) four *tranches*. The first tranche will be liable for the first 5% of any losses due to defaults or ratings downgrades. This is a very risky tranche, since if only 2.5% of the initial loan portfolio defaults this amounts to a 50% loss on the first tranche – it is ‘toxic waste’. The first tranche is often retained by the originator of the CDO, since it is difficult to sell to investors. The second

and third tranches might be liable for the next 10% and 15% of losses, respectively, leaving the fourth tranche liable for any losses greater than 30% on the initial portfolio of securities. Tranches 2–4 will be sold to investors. Representative promised yields on tranches 4 (least risky) to 1 might be 6%, 8%, 16% and 32% – these are yields before any allowance for expected defaults.

Tranche 4 might be rated AAA by S&P rating agency since it will not be affected by credit events until the original portfolio has fallen in value by more than 30%. The ratings for the other tranches will depend on their perceived risk, which depends on the default risk for each of the bonds in the portfolio and the default correlations between the issuers of the bonds. Hence CDO are a means of creating some high-quality debt from average (or low-quality) debt in the original portfolio. This of course assumes that each tranche of the debt is correctly rated and gives the correct ‘signals’ to buyers of the CDOs about the risk.

In the 2007 US *sub-prime mortgage crisis*, many home owners had been given huge loans of 100% or more of the value of the house. Some could not meet their repayments and house prices in the US also fell, so the collateral underlying these loans was suspect – hence some major banks such as Merrill Lynch, Citigroup and UBS took large losses on their CDOs.

Regulation

Trading between different players requires rules – these are sometimes self-imposed and sometimes imposed by law. There are a myriad of regulatory rules in developed financial markets. In the US the Securities and Exchange Commission (SEC) has broad oversight over the trading of securities, but some markets are regulated by other bodies (e.g. the futures market is regulated by the Commodity Futures Trading Commission, CFTC). However, there is a great deal of self-regulation, so the National Association of Securities Dealers (NASD) oversees players in the NASDAQ stock market and the NYSE has its own regulatory body. Professional institutions such as the Chartered Financial Analyst (CFA) Institute also ensure standards of professional expertise and conduct. The Federal Reserve Board has broad responsibility for the overall financial system, regulating bank lending to security market traders and also setting margin requirements on stocks and stock options.

Where there is lots of money to be made, some people are inclined to cheat or bend the rules, as they might say. Sometimes the law has a direct impact such as the legal cases brought against certain traders (e.g. Henry Blodgett of Merrill Lynch) and institutions (e.g. mutual fund market timing scandal by Elliot Spitzer, the New York Attorney General).

In the UK, the Financial Services Authority (FSA) is a key regulator for most financial institutions and has the power to impose fines on institutions, but the Bank of England has responsibility for issues relating to systemic risk.

Financial institutions are subject to market (price) risk and risk of counterparties’ default (credit) risk. The Basle Committee of Central Bankers has devised a common set of rules so that banks’ capital provisions are based on their market and credit risk exposure.

1.3 ISSUES AND IDEAS

It is not difficult to think of issues that face companies, financial intermediaries and individual investors. We want to raise some of these and at the same time mention some concepts that might be useful in answering these questions – which are then dealt with in the rest of the book.

Companies have to decide whether to undertake investment in new plant or equipment, or to buy a potential takeover target. Investors have to decide if it is worth paying the market price for a stock or bond. This involves **valuation**. The investment project for the firm or the takeover of another firm involves assessing what the future cash flows from these investments will be. But we should not treat all future cash flows equally. It seems intuitively obvious that first, cash flows that accrue further in the future should be valued less than cash flows that ‘arrive’ early; and secondly, if cash flows are highly uncertain then these should have a lower value than cash flows that are more certain. These two facts are dealt with by using **discounting and present value** techniques. Cash flows that you receive from holding a government bond (known as coupons) are more certain than cash flows (dividends) from holding equity, so the latter cash flows will be discounted more heavily when calculating the present value. Put another way, the discount rate used for dividend payments on a stock will be higher than the discount rate used for coupon payments on a government bond.

Your estimate today of the intrinsic value of the future cash flows from an asset is known as the **fair value (V)** of the asset, also called the ‘true’ or ‘theoretical’ value. The fair value should be determined by ‘fundamentals’; that is, economic variables that influence, for example, the future dividend prospects of a firm based on its published accounts and company strategy. To decide whether to purchase the asset (i.e. new factory, takeover target, stocks or bonds) you compare the fair value of the asset with the market price P (i.e. cost of the asset). If $P < V$ you buy the asset and if $P > V$ you sell the asset.

How do we decide exactly how much to discount future cash flows when valuing an asset? The way we approach this question is to see what determines the average return investors require in order to be willing to hold a risky asset like a stock. The higher the perceived risk of a stock, we would expect that investors require a higher average return and hence the discount rate should be higher. The difficulty is in determining what exactly constitutes risk and how to measure it. The **Capital Asset Pricing Model** and other multifactor models are of key importance here.

Let’s now turn to investors. We assume that they like return but dislike risk. A key issue is how to combine several assets (e.g. stocks, bonds, cash) in order to obtain the right combination of risk and expected return for the investor – this is dealt with in **portfolio theory** (asset allocation). Portfolio theory demonstrates that even if, blindfolded, you throw around 35 darts at the stock price pages of the *Wall Street Journal* and put equal amounts in each stock you hit, this random portfolio of stocks will have much less risk than any of the stocks taken individually. This *naïve diversification* is about the only ‘free lunch’ in finance. It arises because each of the 35 firms is affected by random events that are largely independent of each other – for example, one firm may be badly affected by a rejection of its patent application while another may find it has an early breakthrough in its biotechnology R&D project. These random **firm-specific** events cancel out in a large portfolio, hence reducing overall risk.

However, you can't get rid of all risk by a *random choice* of stocks. Your diversified portfolio will still experience 'ups and downs' because of the **market risk** that affects the returns on all firms to a greater or less extent. For example, changes in interest rates by the Central Bank can affect the returns of many firms – however, not all by the same quantitative amount (e.g. bank stocks may be more affected by interest rate changes than the stocks of media firms). Portfolio theory tells you how to combine stocks, not in a naïve or random way, but on the contribution they make to the return and risk of your *overall portfolio*. You can trade off higher risk against a higher return to obtain the best or optimal combination of risky assets in your portfolio – this is *efficient* diversification and leads to a concept called the *efficient frontier*. So far we have just discussed the choice *among* a set of risky assets. But portfolio theory also addresses the *asset allocation* question; that is, whether you should put most of your own funds in your 'best' portfolio of risky assets and only a little in a risk-free asset such as a bank deposit (or vice versa). This depends on how risk averse or risk tolerant you are.

Hedging

Suppose you run a mutual fund and by July you have already made considerable gains since the beginning of the year. However, you think that over the next six months the market will be more volatile than usual and as your performance will be assessed in six months' time you want to 'lock in' the value of your portfolio at its current level – this is hedging.

To keep things simple, suppose you hold 10,000 shares of AT&T – this is highly risky, since AT&T's share price on the NYSE can move up or down by a large amount. However, suppose you can find another (mystery) asset F that is traded in Chicago, whose price is also risky. Now, suppose the return on AT&T shares and the return held on your position in asset F are *perfectly negatively correlated* and also move dollar for dollar. This means that every time the AT&T share price goes up by \$1 in New York the value of your position in asset F goes down by \$1 in Chicago. Hence if you hold *both* risky assets, the gain on one is offset by the loss on the other and you have reduced the riskiness of your overall portfolio – that is, AT&T shares plus your position in asset F – to zero. Your initial position in AT&T shares has been perfectly **hedged** with your position in asset F. As we shall see, the mystery 'asset F' that is used to hedge an existing position in some other (underlying) asset (e.g. AT&T stocks) is a (short) position in a futures contract (on AT&T stock) – this is discussed in Chapter 24.

Another simple example of hedging is if you are a UK resident who holds shares in the US company AT&T, which you intend to sell in a year's time. You are subject to two sources of risk: the dollar value of the AT&T shares, and the risk that the dollar–sterling exchange rate will move against you. Today you can (partially) hedge the foreign exchange risk by agreeing to sell the US dollars you expect to obtain in a year's time from selling your AT&T shares, in exchange for sterling at the agreed one-year forward rate of exchange; see Chapter 18.

Another way of changing the risk profile of your portfolio is to ensure that your initial portfolio of 10,000 AT&T shares does not fall below a certain minimum value, but also allowing yourself to benefit from any increase in the value of the shares on the NYSE. This is a form of **insurance**. So-called call and put options can be used to provide insurance – not surprisingly, this branch of finance is often referred to as **financial engineering**.

Speculation

While portfolio theory suggests that you hold a diversified stock portfolio, you might think you have superior information on certain stocks and can use this information to ‘beat the market’. This is **active management** (or more commonly ‘stock picking’ or speculation). This suggests that you are able to identify underpriced or overpriced stocks; that is, stocks where the market price is above or below the ‘true’ or ‘fair’ value for the stock.

For example, suppose you have a method for determining the fair value of a particular stock based on your forecasts of future cash flows for the firm and after careful scrutiny of the company’s accounts and future plans (i.e. based on the ‘fundamentals’ of the firm). Suppose the market price, $P = \$90$, is less than your estimate of the fair value, $V = \$100$. If you believe your forecast is superior to that of other market participants, you should purchase this underpriced stock and wait. If your view about future prospects for this firm are correct, then the rest of the market should eventually recognise this, revise its view of fundamental value to be $V = \$100$ and also purchase the stock. As many traders step in to purchase the stock its market price will rise, until the market price $P = \$100$, which equals its fair value. You personally can then sell the stock at a \$10 profit. You have done this because you traded on superior information *to the market* – valuable information is differential (and correct) information.

This speculative strategy is a form of **risky arbitrage**, since a moment’s thought will alert you to the potential uncertainties in the strategy – although we will ignore these here. Generally, speculators do not like risk (i.e. they are **risk averse**), but providing the potential rewards from speculation are sufficient to cover the risks in the trade (and transaction costs of buying and selling shares), speculation is perfectly rational. On the other hand, *gamblers* will bet on events that are risky just for the love of gambling, even though it can be shown that the expected returns from their repeated bets will leave them worse off (e.g. roulette, where the ‘house’ wins if the ball lands on 0 or 00 and there are numbers 1 to 36 on the wheel, see chapter 10).

Assume that your fundamental analysis has been successful: the market recognised the mispricing and corrected it, bringing the market price into line with the fundamental value. If this happens quickly the market is said to be ‘efficient’ – or put another way, ‘the price is right’. If at the outset the market had the same information as you and processed it in the same way, then the price would always have been equal to fair value – the market would have incorporated this information in its price quotes and you would never have found a trader who was quoting $P = \$90$.

The **efficient markets hypothesis (EMH)** suggests that it is hardly ever possible to make money by stock selection – after taking account of transaction cost and the riskiness of the strategy. This is because there are so many informed traders in the market that the price of the stock is always kept arbitrarily close to the fair value. So the EMH implies $P = V$ at all times – in other words, ‘the price is right’. The EMH recognises that there may sometimes be a small discrepancy between P and V , but this is not large enough for a speculator to make enough profit to cover her transaction costs in the trade and to compensate her for the fact that the trade is highly risky. If the EMH is true, then economic welfare may well be enhanced if we (metaphorically) shoot nearly all the ‘Masters of the Universe’ (e.g. ‘King Henry’ Blodgett of Merrill Lynch, Nick Leeson of Barings etc.) and close down nearly all active mutual and hedge funds. So you can see that this is a big question and many ‘big guns’ in finance have tried to address it.

Why might profitable opportunities occasionally be available to well-informed investors? One reason might be that not all traders base their decisions about the fair price of a share on economic fundamentals. Speculation can be based on a forecast of ‘fundamentals’ (as described above with AT&T shares) and these speculators, if they are correct on average, help to bring prices in line with fundamental value. However, some speculators might not forecast returns based on fundamentals but merely on ‘rules of thumb’, which they see (or think they see) in the data. For example, some speculators might base their analysis of future returns based purely on the past behaviour of returns. A speculator might have a rule that says ‘buy a stock after a rise of more than 2% on any one day and then sell it if it subsequently falls more than 2% in a day’ – these speculators are known as **noise traders**, since they do not use any information about the economic fundamentals of the company (e.g. costs and revenues) in making their ‘bets’.

If there are a substantial number of noise traders in the market, then they might push the quoted price of a share away from its fair value and therefore ‘the price may not be right’. Not only that, but ‘fundamental traders’ (i.e. ‘rational speculators’ or ‘risky arbitrageurs’) may be able to take advantage of the ‘irrational behaviour’ of noise traders and hence make a profit from stock trading at the expense of the noise traders.

The idea that there are strategies whereby you can ‘beat the market’ has spawned many investment techniques such as chartism, candlesticks, neural networks and so on, and alternative strategies such as value growth and momentum. When it appears that we can ‘beat the market’ we say there are pricing anomalies – rational explanations for such anomalies are to be found in the **behavioural finance** literature.

Any marketable financial asset can provide a vehicle for speculation, including bonds, foreign currency, futures and options. Although speculative activity is often frowned on by outsiders, nevertheless, as we shall see, speculators provide funds to enable hedging activity to take place (which is usually applauded by outsiders).

There are two very good rules of thumb to apply to financial markets, which you ignore at your peril.

- If you see the prospect of a high average return from repeated ‘bets’, this will usually imply a high level of risk ‘hiding’ somewhere in the background.
- There are few (if any) ‘free lunches’ in financial markets – the market is efficient most of the time and you pay ‘fair value’ for most ‘meals’ (i.e. assets) you purchase.

Arbitrage

We have already noted that some asset prices (e.g. stocks) are determined by **risky arbitrage**; that is, setting the price of an asset equal to its fair value based on economic fundamentals.

However, the term **arbitrage** is usually reserved for transactions that are (in principle) risk-free. For example, arbitrage implies that two identical assets (e.g. shares of AT&T) cannot simultaneously sell for two different prices on two different stock exchanges.

For instance, if oil is being quoted by one trader at \$70 per barrel and by a trader on another exchange at \$75 a barrel, then you can get on the phone (or computer network) and purchase at \$70 and *simultaneously* sell to the other trader at \$75 per barrel. You never see the oil but you make \$5 on the deal (excluding transaction costs) – which is virtually risk free, as the two trades are undertaken simultaneously. So, if this were to happen even for an instant, traders would buy at the low price and simultaneously sell in the other market at a high price. The large number of buy trades would raise the price in one market while the large number of sell trades would lower it in the other, bringing the prices quickly into equality. This is the process of (risk-free) arbitrage.

We noted above that **derivatives** (forwards, futures, options, swaps) have value because their payoff depends on the price of the spot asset ‘underlying’ derivative contract (e.g. stocks, bonds, oil, silver etc.). Arbitrage is an important concept in the pricing of derivative securities, since it ensures that by trading in two markets (e.g. the futures market in Chicago and the spot market for shares in New York), the price of the derivatives contracts (e.g. futures contract on a stock) is closely linked to the price of the underlying asset in the spot market (shares in New York). The reason two prices in two different geographical locations may move dollar for dollar is due to arbitrage. Arbitrage was also the insight that allowed Black, Scholes and Merton to produce the famous Black–Scholes–Merton options pricing formula in 1973, which later won them the Nobel prize in economics (Black did not receive the prize as it cannot be awarded posthumously).

Figure 1.1 summarises the role of arbitrageurs, hedgers and speculators – all these players are needed so that financial markets function correctly.

Market risk and credit risk

The final issue we want to comment on is how we measure the overall risk of financial institutions such as a large investment bank, which holds a wide variety of marketable assets such as stocks, bonds, foreign assets and derivative securities. Two key risks are market risk, due to fluctuations in asset prices, and credit risk, due to default or credit downgrades of the counterparties with which the bank deals. For example, the hedge fund Long Term Capital Management (LTCM) lost around \$4bn in 1997 and was rescued by a consortium of banks

- Arbitrageurs:
 - Ensure that quoted price = ‘fair value’ (risky arbitrage)
 - Equalise prices of identical securities (risk-free arbitrage)
- Hedgers:
 - Offset risks that they currently face
- Speculators:
 - Take risky ‘open’ positions to exploit profitable opportunities
 - May be based on ‘fundamentals’ - equivalent to ‘risky arbitrage’
 - May involve ‘rules of thumb’ - and hence noise traders

FIGURE 1.1: Traders

at the request of the Federal Reserve Board under Alan Greenspan. LTCM failed to assess its risk correctly. There are various methods used to measure the changing market risk of a diverse portfolio of assets and this is generally referred to as **Value at Risk** – pioneered by J. P. Morgan’s risk management group.

The reason for the rescue of LTCM was that a number of banks had lent it considerable sums of money and it was thought that if LTCM went into liquidation, this would also impair the solvency of some banks. The banks were counterparties to loans they had supplied to LTCM and this gave rise to **credit risk**. There are many other forms of risk. **Liquidity risk** is the risk that you can only sell off a substantial amount of your assets within a reasonable period by pushing the price well below its current price. This is because in times of crisis there may be only a few traders who will take the opposite side of the trade (i.e. buy the assets from you). In the case of banks, liquidity risk sometimes refers to the difficulty they might have in raising short-term wholesale deposits (e.g. large three-month deposits from other banks). If the bank cannot obtain funds from the wholesale markets then it will not be able to finance its loan portfolio. The bank is not bankrupt because (we assume) the value of its assets (i.e. loans) exceeds that of its deposit liabilities, but it may have a short-term liquidity crisis. Central Banks can lend ‘cash’ on a short-term basis to such banks (in exchange for banks providing the Central Bank with ‘collateral’ in the form of ‘high-grade’ assets such as T-bills and government T-bonds; this is known as the lender of last resort facility). For example, this is operated via the ‘discount window’ at the US Federal Reserve Bank. Other risks include **operational risk** (i.e. failure of computer systems), **legal risk** (enforceability of contracts) and outright fraud.

When banks face a liquidity crisis and they cannot borrow from other banks in the interbank market, there may be a ‘run’ on the bank (i.e. depositors queuing up outside to get their money out). Then Central Banks must step in to provide liquidity (to solvent banks) as a lender of last resort. The decision of whether to provide liquidity to a bank that is also likely to be insolvent often finally rests with the government (Treasury), since ultimately any losses are paid by taxpayers – this may involve a redistribution of wealth from taxpayers (who are not depositors in the failed bank) to those with deposits in the bank.

If the market or credit risk of a bank’s assets is thought to be too high, then either the positions in risky assets must be reduced or the bank must offset the risk it currently holds by hedging some of its risky positions (e.g. by using derivatives). Note that commercial firms can also use derivatives markets to reduce some of their business risks – for example an airline can use derivatives markets to hedge risks due to fuel prices.

SUMMARY

- The key players in financial markets are individuals, firms and investment companies such as banks, pension funds and insurance companies, mutual funds and hedge funds.
- Firms obtain external finance for investment projects and for mergers and takeovers by issuing bonds and stocks.

- Central banks can influence short-term interest rates that then feed through to long-term rates – this is the term structure.
- Portfolio theory is used to determine the best combination of risky assets to include in your diversified portfolio – it addresses the asset allocation problem. It also considers the question of how you should divide your own wealth between risky assets (such as stocks) and a risk-free asset (such as a bank deposit).
- The fair value of an asset is the value today of the future cash flows from the asset. Present value techniques are used to estimate fair value.
- The efficient markets hypothesis (EMH) implies that the market price always equals the fair value of the asset – so ‘the price is right’ and active investors can’t ‘beat the market’.
- The behavioural finance literature tries to explain why some prices may not equal fair value and hence it may be possible to ‘beat the market’ by using techniques such as chartism, candlestick, neural networks and so on, or using strategies such as value, growth or momentum.
- Derivatives are priced by arbitrage and they are useful for hedging and speculation.
- Value at Risk refers to the risk of banks’ assets due to price changes and credit risk is the risk of default from counterparties.

EXERCISES

- Q1** If the government has a persistent budget deficit of, say, \$30bn (assume this is equivalent to 5% of the total output of the economy; that is, of GDP), then how can it finance the deficit and what might be the consequences for the economy in general?
- Q2** Why have financial intermediaries become so important in the economy? Do you think they will survive in their present form?
- Q3** What is the yield curve and what does it tell you?
- Q4** What is an asset-backed security (ABS)?
- Q5** How might a large bank seek to reduce the riskiness of its overall holdings of bank loans?
- Q6** If you hold around 35 stocks chosen randomly from the pages of the *Wall Street Journal*, why is the riskiness of this portfolio much less than the average risk of holding one stock chosen at random?
- Q7** A bank’s source of funds consists of deposits on which it pays a variable (floating) interest rate (LIBOR–1%), but its assets consist mainly of long-term loans that pay a fixed interest rate of 8%. LIBOR is currently 7%. What is the interest rate risk the bank faces? Assume that the liabilities and assets of the bank are \$100m.

