Company Valuation and Share Price

Part I

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Part One: An Introduction

1 An Overview

Introduction

The 2007 global financial crisis ignited by reckless bankers and their flawed reward structures will be felt for years to come. Emerging from the wreckage, however, is renewed support for the over-arching objective of traditional finance theory, namely the long-run maximisation of shareholder wealth using the current market value of ordinary shares (common stock) as a benchmark.

If capitalism is to survive, it is now widely agreed that conflicting managerial aims and short-term incentives, which now seem to characterise every business sector, must become entirely subordinate to the preservation of ownership wealth, future income and capital gains.

And as we shall discover, the key to resolving this *principle-agency* problem begins with a *theoretical* critique of how shares are valued. This not only underpins the *practical* measures of current and historical stock market performance published in the financial press (price, yield, cover, and the P/E ratio) used by market participants throughout the world. It also provides private individuals and the companies or financial institutions acting on their behalf with a common framework to analyse all their future investment decisions, whether it is an individual share transaction, a market placement, or corporate takeover activity.

1.1 Some Observations on Traditional Finance Theory

Based on the *Separation Theorem* of Irving Fisher (1930), traditional *normative* theory explains how corporate management should maximise shareholder wealth by maximising the expected net present value (NPV) of all a firm's investment projects.

According to Fisher, in a world of *perfect* capital markets, characterised by *rational-risk averse* investors, with *no barriers* to trade and a *free flow* of information, it is also irrelevant whether a company's future project cash flows are distributed as dividends to match shareholders consumption preferences at any point in time. If a company decides to retain profits for reinvestment, shareholder wealth measured by share price will not fall, providing that:

Management's *minimum* required return on new projects financed by retention (the discount rate) at least equals the shareholders' *opportunity* rate of return (yield) that they can expect to earn on alternative investments of comparable risk, or their the *opportunity* cost of capital (borrowing rate).

If shareholders need to borrow to satisfy their consumption (income) requirements they can do so at the market rate of interest, leaving management to reinvest current earnings (unpaid dividends) on their behalf to finance future investment, growth in earnings and future dividends.

Following Fisher's logic, all market participants should therefore earn a return commensurate with the risk of their investment. And because *perfect* markets are also *efficient* markets, shares are immediately and correctly priced at their *intrinsic* value in response to managerial policy, just like any other information and current events.

Yet, we now know that markets are *imperfect*. Investors may be *irrational*, there are *barriers* to trade and information is *limited* (particularly if management fail to communicate their true intentions to shareholders) any one of which invalidates Fisher's theorem. As a consequence, the question subsequent twentieth century academics sought to resolve was whether an *imperfect* capital market can also be *efficient*. To which the answer was a resounding "yes".

Based on the pioneering work of Eugene Fama, which began to emerge in the 1960s, modern finance theory now hypothesises that real-world stock markets may not be *perfect* but are *reasonably efficient*. Shareholder wealth maximisation is premised on the law of supply and demand. Large numbers of investors are assumed to respond rationally to new public information, good, bad, or indifferent. They buy, sell, or hold shares in a market without too many barriers to trade. A privileged few, with access to *insider* information, or either the ability, time or money to analyse all *public* information, may periodically "beat the market" by being among the first to react to events. But share price still reverts *quickly* if not *instantaneously* to a new *equilibrium* value, correctly priced, in response to the *technical* and *fundamental* analyses of historical trends and the latest news absorbed by the vast majority of market constituents.

Today's trading decisions are assumed to be *independent* of tomorrow's events. So, markets are assumed to have "no memory". And because share prices and returns therefore exhibit *random* behaviour, conventional wisdom, now termed the *Efficient Market Hypothesis* (EMH), states that in its *semi-strong* form:

- *Short term*, investors win some and lose some.
- *Long term*, the market is a "fair game" for all, providing returns commensurate with their risk.

Today, even in the wake of the first global financial crisis of the 21st century, governments, markets, financial institutions, companies and many analysts continue to cling to the wreckage by promoting policies premised on the theoretical case for semi-strong efficiency. But since the 1987 crash there has been an increasing unease within the academic community that the EMH in any form is "bad science". Many observe that "it puts the cart before the horse" by relying on simplifying assumptions, without any empirical evidence that they are true. Financial models premised on rationality, efficiency and randomness, which are the bedrock of modern finance, therefore attract legitimate criticism concerning their real world applicability.

1.2 Some Observations on Stock Market Volatility

Over the past decade, global capital markets have experienced one of the most volatile periods in their entire history. For example, since the millennium, the index of Britain's highest valued companies, the FT-SE 100 (Footsie) has often moved up and down by more than 100 points in a single day, fuelled by the extreme price fluctuations of risky internet or technology shares, the changing profitability of blue-chip companies at the expense of emerging markets, rising oil and commodity prices, interest rates, global financial crises, increased geo-political instability, military conflict, natural disasters and even nuclear fallout. Consequently, conventional methods of assessing stock market performance, premised on efficiency and stability, as well as the models upon which they are based, are now being seriously questioned by a new generation of academics and professional analysts.

So, where do we go from here?

Post-modern theorists with their cutting-edge mathematical expositions of speculative bubbles, catastrophe theory and market incoherence, believe that *markets have a memory*. They take a *non-linear* view of society and dispense with the assumption that we can *maximise* anything. Unfortunately, their models are not yet sufficiently refined to provide simple guidance for many market participants (notably private investors) in their quest for greater wealth.

Irrespective of its mathematical complexity, the root cause of the problem is that however you model it, financial analysis is not an exact *physical* science but an imprecise *social* science. And history tells us that the theories upon which it is based may even be "bad" science.

All economic decisions are characterised by *hypothetical* human behaviour in a *real* world of *uncertainty* that by definition is *unquantifiable*. Thus, theoretical financial strategies may be logically conceived but are inevitably based on objectives underpinned by *simplifying assumptions* that rationalise the complex world we inhabit. At best they may support our model's conclusions. But at worst they may invalidate our analysis.

As long ago as 1841, Charles Mackay's classic text "Extraordinary Delusions and the Madness of Crowds (still in print) offered a plausible *behavioural* explanation for volatile and irrational financial market movements in terms of "crowd behaviour". He asserted that:

> It is a natural human tendency to feel comfortable in a group and only make a personal decision, which may even be irrational, after you have observed a trend.

The late Charles P. Kindleberger's classic twentieth century work "Manias, Panics and Crashes: A History of Financial Crises" first published in 1978 provides further insight into Mackay's "theory of crowds" As a study of frequent irrational investor behaviour in sophisticated markets, the book became essential reading in the aftermath of the 1987 global crash. Now in its sixth edition (2011) revised and fully expanded by Robert Aliber to include analyses of the causes, consequences and policy responses to the 2007 financial crisis, it is even more relevant today.

Kindleberger and Aliber argue that every financial crisis from *tulip mania* onwards has followed a similar pattern. Speculation is always coupled with an economic boom that rides on new profit opportunities created by some major exogenous factor, like the end of a war (1945 say) a change in economic policy (stock market de-regulation) a revolutionary invention (like the computer) political tension (the Middle East) or a natural disaster (Japan). Fuelled by cheap money and credit facilities (note the interest rate cuts that financed American post-Gulf war exuberance and the internet boom of the 1990s) prices and borrowing rise dramatically. At some stage a few insiders decide to sell their investments and reap the profits. Prices initially level off, but a period of market volatility ensues as more investors sell to even bigger fools. This stage of the cycle features financial distress, characterised by financial scandals, bankruptcies and balance of payment deficits, as interest rates rise and the market withdraws from financial securities into cash. The process tends to degenerate into panic selling that may result in what Kindleberger terms "revulsion".

At this point, disillusioned investors refuse to participate in the market at all and prices fall to irrationally low levels. The key question then, is whether prices are low enough to tempt even sceptics back into the market.

Robert Shiller, in his recent edition of "Irrational Exuberance" (2005) developed Kindleberger's analysis by citing investors who act in unison but not necessarily rationally. Market sentiment gains a popular momentum, unsubstantiated by any underlying corporate profitability, intrinsic asset values, or significant economic events, which are impossible to unscramble as more individuals wait to sell or buy at a certain price. When some psychological barrier is breached, price movements in either direction can be triggered and a crash or rally may ensue. As Shiller concludes, if *Wall Street is a place to avoid*, the question we must ask ourselves is how can market participants (private individuals, or companies and financial institutions who act on their behalf) satisfy their investment criteria in a post-modern world.

Fortunately, traditional finance theory can still throw a lifeline. Human action, reaction, or inaction may be reinforced by habit and individual investors may only become interested in a market trend (up or down) when it has run its course and a crash or rally occurs. But in between time, when markets are reasonably *stable, bullish* or *bearish*, there are plausible strategies for individuals and financial institutions that continually trade shares, as well as companies considering either a stock market listing for the first time, or periodic predatory takeovers.

All are based on today's news, current events, historical data contained in published accounts, the financial press, as well as the internet and other media that relay financial service, analyst and broker reports. And as we shall discover, until new models are sufficiently refined to justify their real world application, the common denominator that drives this information overload upon which investment strategies are based is still conventional share price theory.

Review Activity

If you have previously downloaded other studies by the author in his *bookboon* series, then before we continue you ought to supplement this Introduction by re-reading the more detailed critiques of Fisher's Theorem, the development of Finance Theory and the Efficient Market Hypothesis (EMH) contained in any of the following chapters.

Strategic Financial Management: Exercises (SFME), Chapter One, *bookboon.com* (2009).

Portfolio Theory and Financial Analyses (PTFA), Chapter One, *bookboon.com* (2010).

Portfolio Theory and Investment Analysis (PTIA), Chapter One, bookboon.com (2010).

These will not only test your understanding so far, but also provide a healthy scepticism for the theory of modern finance that underpins the remainder of this text.

If new to *bookboon* then I recommend you at least download SFME and pay particular attention to Exercise 1.1.The exercise (plus solution) is logically presented as a guide to further study and easy to follow.

Throughout the remainder of this book, each chapter's exercises and equations also follow the same structure as all the author's other texts. So, you should be able to complement, reinforce and test your theoretical knowledge of the practicalities of corporate valuation at *your own pace*.

Summary and Conclusions

The key to unlocking stock market analysis, irrespective of volatility, is an understanding of theories of share price determination that underpin its performance. Traditional financial theory assumes that:

Shareholder wealth maximisation (increased share price) is based upon the economic law of supply and demand in a capital market that may not be *perfect* but *reasonably efficient*.

Investors respond *rationally* to new information (good, bad or indifferent) and buy, sell, or hold shares in a market without too many barriers to trade.

As a consequence, yesterday's trading decision (and price) is *independent* of today's state of play and investment is a "fair game" for all.

However, the view taken here is that irrespective of whether markets are efficient, investors are rational and prices or returns are random, the investment community still requires standards of comparison to justify their latest trading decisions and stay in their comfort zone. And in this respect, despite its deficiencies, traditional finance theory has much to offer.

Explained simply, stock market performance is not an *absolute* but *relative*. It must be related to some *standard* of comparison. For example, has a firm's current share price risen, fallen, or stayed the same, relative to the market the market as a whole, its own business sector and its direct competitors since yesterday, or over the past 52 weeks say, as revealed by the financial press? And if so, how does its return, evidenced by either dividend yields or P/E ratios, fit into a *comparative* performance analysis?

To answer these questions we shall therefore begin our analyses with the theoretical determinants of share price and specifically the *capitalisation of a perpetual annuity*. This concept underpins the derivation of *maintainable* dividend yields and the P/E ratio, which are published world wide in the financial press.

As we shall discover, this model enables current shareholders and prospective investors (including management) to evaluate the risk-return profiles of their latest dividend and earnings expectations *vis a vis* current share prices for any company of interest.

Moving on, we shall explain and analyse how share price listings that encompass dividends (the yield and cover) and earnings (the P/E ratio) are used to implement trading decisions (*i.e.* whether to "buy, sell or hold").

Having read this text, you should also be in no doubt that:

The derivation of a share's price that utilises NPV cash flow analyses of prospective earnings or dividends, rather than historical data drawn from published financial accounts, represents an ideal wealth maximisation criterion throughout the investment community.

Selected References

1. Fisher, I., *The Theory of Interest*, Macmillan, 1930.
2. Fama, E.F., "The Behaviour of Stock Market Prices", *Journal of Business*, Vol. 38, 1965.
3. Mackay, L.L. D., (originally published in 1841), *Extraordinary Delusions of Madness of Crowds*, Farrar, Strauss and Giroux, 2011.
4. Kindleberger, C.P.and Aliber, R.Z., *Extraordinary Manias, Panics and Crashes: A History of Financial Crises,* Palgrave and MacMillan, 2011.
5. Shiller, R.J., *Irrational Exuberance,* Princeton University Press, 2005.
6. Hill , R.A., bookboon.com.
   Strategic Financial Management: Exercises (SFME), Chapter One, 2009.
   Portfolio Theory and Financial Analyses (PTFA), Chapter One, 2010.
   Portfolio Theory and Investment Analysis (PTIA), Chapter One, 2010.

Part Two: Valuation Theories

2 How to Value a Share

Introduction

The key to understanding the basic measures of stock market performance (price, yield, P/E ratio and cover) used by investors to analyse trading decisions requires a theoretical appreciation of the relationship between a share's price and its return (dividend or earnings) using various models based on discounted revenue theory.

To set the scene, we shall keep the analysis simple by outlining the theoretical determinants of share price with particular reference to the *capitalisation of a perpetual annuity* using both a dividend yield, and earnings yield. Detailed consideration of the controversy as to whether dividends or earnings are a prime determinant of share price will be covered in Chapter Three.

2.1 The Capitalisation Concept

Discounted revenue theory defines an investment's present value (PV) as the sum of its relevant periodic cash flows (C_t) discounted at an appropriate opportunity cost of capital, or rate of return (r) on alternative investments of equivalent risk over time (n). Expressed algebraically:

$$(1) \quad PV_n = \sum_{t=1}^{n} C_t / (1+r)^t$$

The equation has a convenient property. If the investment's annual return (r) and cash receipts (C_t) are *constant and tend to infinity*, ($C_t = C_1 = C_2 = C_3 = C\infty$) their PV simplifies to the formula for the *capitalisation of a constant perpetual annuity*:

$$(2) \quad PV_\infty = C_t / r = C_1 / r$$

The return term (r) is called the *capitalisation* rate because the transformation of a cash flow series into a capital value (PV) is termed "capitalisation". With data on PV∞ and r, or PV∞ and C_t, we can also determine C_t and r respectively. Rearranging Equation (2) with one unknown:

$$(3) \quad C_t = PV_\infty \cdot r$$

$$(4) \quad r = PV_\infty / C_t$$

Activity 1

The previous PV equations are vital to your understanding of the various share valuation models that follow. They also underpin the remainder of this study. If you are unsure of their theory and application, then I recommend that you download *Strategic Financial Management (SFM)* from the author's bookboon series and read Chapters Two and Five before you continue.

Having completed this reading, you will appreciate that shares may be traded either *cum-div* or *ex-div*, which means they either include (cumulate) or exclude the latest dividend. For example, if you sell a share *cum-div* today for P_0 the investor also receives the current dividend D_0. Excluding any transaction costs, the investor therefore pays a total price of (D_0 + P_0). Sold *ex -div* you would retain the dividend. So, the trade is based on current price (P_0) only.

This distinction between *cum-div* and *ex-div* is important throughout the remainder of our study because unless specified otherwise, we shall adopt the time-honoured academic convention of defining the current price of a share using an *ex-div* valuation.

2.2 The Capitalisation of Dividends and Earnings

Irrespective of whether shares are traded *cum-div or ex-div*, their present values can be modelled in a *variety* of ways using discounted revenue theory. Each depends on a definition of future periodic income (either a dividend or earnings stream) and an appropriate discount rate (either a dividend or earnings yield) also termed the equity capitalisation rate.

For example, given a forecast of periodic future dividends (D_t) and a shareholder's desired rate of return (K_e) based on current dividend yields for similar companies of equivalent risk:

The present *ex-div* value (P_0) of a share held for a *given* number of years (n) should equal the discounted sum of future dividends (D_t) plus its eventual *ex-div* sale price (P_n) using the current dividend yield (K_e) as a capitalisation rate.

Expressed algebraically:

$$(5) \quad P_0 = [(D_1 / 1 + K_e) + (D_2 / 1 + K_e)^2 + \ldots.. + (D_n / 1 + K_e)^n] + (P_n / 1 + K_e)^n$$

Rewritten and simplified this defines the *finite-period dividend valuation model:*

$$(6) \quad P_0 = \sum_{t=1}^{n} D_t / (1+K_e)^t + P_n / (1 + K_e)^n$$

Likewise, given a forecast for periodic future earnings (E_t) and a desired return (K_e) based on current earnings yields of equivalent risk:

The present *ex-div* value (P_0) of a share held for a *given* number of years (n) equals the sum of future earnings (E_t) plus its eventual *ex-div* sale price (P_n) all discounted at the current earnings yield (K_e).

Algebraically, this defines the *finite-period earnings valuation model:*

$$(7) \quad P_0 = \sum_{t=1}^{n} E_t / (1+K_e)^t + P_n / (1 + K_e)^n$$

Activity 2

A logical approach to financial analysis is to make *simplifying* assumptions that rationalise its *complexity*. A classic example is the derivation of a series of dividend and earnings valuations, other than the *finite* model. Some are more sophisticated than others, but their common purpose is to enable investors to assess a share's performance under a variety of conditions.

To illustrate the point, briefly summarise the theoretical assumptions and definitions for the following models based on your reading of *SFM* (Chapter Five) or any other source material.

The *single-period* dividend valuation
The *general* dividend valuation
The *constant* dividend valuation

Then give some thought to which of these models underpins the data contained in stock exchange listings published by the financial press worldwide.

We know that the *finite-period* dividend valuation model assumes that a share is held for a given number of years (n). So, today's *ex div* value equals a series of expected year-end dividends (D_t) plus the expected *ex-div* price at the end of the entire period (P_n), all discounted at an appropriate dividend yield (K_e) for shares in that risk class. Adapting this formulation we can therefore define:

- The *single-period* dividend valuation model

Assume you hold a share for one period (say a year) at the end of which a dividend is paid. Its current *ex div* value is given by the expected year-end dividend (D_1) plus an *ex-div* price (P_1) discounted at an appropriate dividend yield (K_e).

- The *general* dividend valuation model

If a share is held indefinitely, its current *ex div* value is given by the summation of an infinite series of year-end dividends (D*t*) discounted at an appropriate dividend yield (K_e). Because the share is never sold, there is no final *ex-div* term in the equation.

- The *constant* dividend valuation model

If the annual dividend (D_t) not only tends to infinity but also remains constant, and the current yield (K_e) doesn't change, then the *general* dividend model further simplifies to the *capitalisation of a perpetual annuity*.

2.3 The Capitalisation of Current Maintainable Yield

Your answers to Activity 2 not only reveal the impact of different assumptions on a share's theoretical present value, but why basic price and yield data contained in stock exchanges listings published by the financial press favour the *constant* valuation model, rather than any other.

Think about it. The derivation and analyses of current share prices based on future estimates of dividends, *ex-div* prices and appropriate discount rates for billions of market participants, even over a single period is an impossible task. To avoid any weakness in forecasting characterised by uncertainty and to provide a *benchmark* valuation for the greatest possible number, stock exchange listings therefore assume that shares are held in *perpetuity* and the latest reported dividend per share will remain *constant* over time. This still allows individual investors with other preferences, or information to the contrary, to model more complex assumptions for comparison. There is also the added commercial advantage that by using the simplest metrics, a newspaper's stock exchange listings should have universal appeal for the widest possible readership.

Turning to the mathematics, given your knowledge of discounted revenue theory based the *capitalisation of a perpetual annuity* (where $PV = C_t / r$) share price listings define a current *ex- div* price (P_0) using the *constant* dividend valuation model as follows:

(8) $P_0 = D_1 / K_e$

Next year's dividend (D_1) and those thereafter are represented by the latest reported dividend (*i.e.* a constant). Rearranging terms, (K_e) the shareholders desired rate of return (equity capitalisation rate) is also a constant represented by the current yield, which is assumed to be *maintainable* indefinitely.

(9) $K_e = D_1 / P_0$

2.4 The Capitalisation of Earnings

For the purpose of exposition, so far we have focussed on dividend income as a determinant of price and value, with only passing reference to earnings. But what about shareholders interested in their *total* periodic returns (dividends plus retentions) from corporate investment? They need to capitalise a post-tax earnings stream (E_t) such as *earnings per share* (EPS) and analyse its yield (K_e). No problem: the *structure* of the valuation models summarised in Activity 2 remains the same but E_t is substituted for D_t and K_e now represents an earnings yield, rather than a dividend yield. Thus, we can define a parallel series of equations using:

The *single-period*, earnings valuation model
The *finite-period*, earnings valuation model
The *general* earnings valuation model
The *constant* earnings valuation model

Turning to stock exchange listings and the financial press, we also observe that for simplicity the publication of earnings data is still based on the *capitalisation of a perpetual annuity*.

(10) $P_0 = E_1 / K_e$

Next year's earnings (E_1) and those thereafter are represented by the latest reported profit (*i.e.* a constant). Rearranging terms, (K_e) the shareholders desired rate of return (equity capitalisation rate) is also a constant represented by the current earnings yield, which is assumed to be *maintainable* indefinitely.

(11) $K_e = E_1 / P_0$

Review Activity

Having downloaded this text and others in the *bookboon* series, it is reasonable to assume that you can already interpret a set of published financial accounts, if not share price data. To test your level of understanding for future reference, select a newspaper of your choice and a number of companies from its stock exchange listings. Then use the data to explain:

- The mathematical relationship between a company's dividend and earnings yields and why the two may differ.
- The definition of earnings yields published in the financial press.

Our discussion of efficient markets in Chapter One explained why a company's shares cannot sell for different prices at a particular point in time. So, it follows that:

(12) $P_0 = D_1 / K_e = E_1 / K_e$

And if a company adopts a policy of full distribution (whereby $D_1 = E_1$) then the equity capitalisation rates for dividends and earnings, using a current maintainable yield (K_e) must also be identical.

(13) $K_e = D_1 / P_0 = K_e = E_1 / P_0$

But what of the more usual situation, where a company retains a proportion of earnings for reinvestment?

Given P_0 (but $D_1 < E_1$) the respective equity capitalisation rates (K_e) now differ.

(14) $K_e = D_1 / P_0 < K_e = E_1 / P_0$

Not only is the dividend yield lower than the earnings yield but as we shall explore in Chapter Three, there is a *behavioural* explanation for relationship between the two. For the moment, suffice it to say that there is also an underlying mathematical relationship. For example, if a company's current share price, latest reported dividend and earnings per share are \$100, \$10 and \$20 respectively, then because earnings *cover* dividends twice (again, more of which later) the dividend yield is half the earnings yield (10 and 20 percent respectively).

This difference in yields is not a problem for investors who know what they are looking for. Some will prefer their return as current income (dividends and perhaps the sale of shares). Some will look to earnings that incorporate retentions (future dividends plus capital gains). Most will hedge their bets by combining the two in share portfolios that minimise risk. So, their respective returns will differ according to their risk-return profile. Which is why share price listings in newspapers worldwide focus on dividends *and* earnings, as well as the *interrelationship* between the two measured by dividend cover.

Moving on to the second question posed by our Review Activity, if you are at all familiar with share price listings published in the financial press, you will be aware of a *convention* that also enables investors to avoid any confusion between dividend and earnings yields when analysing a share's performance.

Given the current earnings yield:

(11) $K_e = E_1 / P_0$

The equation's terms can be rearranged to produce its *reciprocal*, the price-earnings (P/E) ratio.

(15) $P/E = P_0 / E_1 = 1/K_e$

Unlike the earnings yield, which is a *percentage* return, the P/E ratio is a *real* number that analyses price as a *multiple* of earnings. On the assumption that a firm's current post tax profits are maintainable indefinitely, the ratio therefore provides an alternative method whereby a company's distributable earnings can be capitalised to establish a share's value.

Because the two measures are reciprocals whose product always equals one, the interpretation of the P/E is that the *lower* the figure, the *higher* the earnings yield and *vice versa*. And because investors are dealing with an *absolute* P/E value and not a *percentage* yield, there is no possibility of confusing a share's dividend and earnings performance when reading share price listings, articles or commentaries from the press and media, analyst reports, or internet downloads.

Finally, having noted that low valuation multipliers correspond to high returns and that a number multiplied by its reciprocal equals one, use Table 2.1 to confirm a *perfect inverse* relationship between a share's P/E and its earnings yield. Not only will this exercise be useful for future reference throughout this text, but future reading of the financial press should also fall into place.

P/E	=	P_0 / E_1	=	1/Ke	50	40	20	15	12	10	8	5	2
Yield	=	E_1 / P_0	=	Ke	2	2.5	5	6.66	8.33	10	12.5	20	50

Table 2.1: The Relationship between the P/E Ratio and Earnings Yields

Summary and Conclusions

This Chapter has outlined the fundamental relationships between share valuation models and the derivation of the cost of equity capital for the purpose of analysing stock market returns.

We set the scene by explaining the derivation of basic share valuation models using discounted revenue theory, with particular reference to the capitalisation of a perpetual annuity. We noted that corresponding equity valuations based on current dividend and earnings should be financially equivalent.

The relationship between an *ex-div* dividend and earnings valuation revealed why a few select metrics (based on price, dividend yield and the P/E ratio) published in the financial press encapsulate a company's stock market performance and provide a guide to future investment.

As we shall discover in later chapters, a share's intrinsic value (price) is only meaningful if we consider other data about a company and then place it in context. For example, given a company's latest reported dividend and profit figures, investors can use existing dividend yields and P/E ratios to place a comparative value on that company's shares. These can then be compared with its actual value (current market price) to establish whether the company is either undervalued, equitable, or overvalued, relative to the market for similar shares of equivalent risk. Needless to say, undervalued, rational investors buy, equitable they hold, overvalued they sell.

Selected References

Hill, R.A., *Strategic Financial Management:* Chapters Two and Five, bookboon.com (2008).

3 The Role of Dividend Policy

Introduction

For simplicity, so far we have assumed that if a share is held indefinitely and future dividends and earnings per share remain constant, the current *ex-div* price can be expressed using the *capitalisation of a perpetual annuity* based on its current dividend or earnings yields. The purpose of this Chapter is to refine the *constant* valuation model by considering two inter-related questions.

- What happens to a share's current price if its forecast dividends or earnings are not constant in perpetuity?
- When valuing a company's shares, do investors value current dividends more highly than earnings retained for future investment?

3.1 The Gordon Growth Model

Chapter One began with a discussion of investment principles in a perfect capital market characterised by certainty. According to Fisher's Separation Theorem (1930), it is irrelevant whether a company's future earnings are paid as a dividend to match shareholders' consumption preferences at particular points in time. If a company decides to retain profits for reinvestment, shareholder wealth will not diminish, providing that:

- Management's *minimum* required return on a project financed by retention (the discount rate, r) matches the shareholders' *desired* rate of return (the yield, K_e) that they can expect to earn on alternative investments of comparable risk in the market place, i.e. their *opportunity* cost of capital.
- In the interim, shareholders can always borrow at the market rate of interest to satisfy their income requirements, leaving management to invest current unpaid dividends on their behalf to finance future investment, growth in earnings and future dividends.

From the late 1950's, Myron J. Gordon developed Fisher's theory that dividends and retentions are *perfect substitutes* by analysing the impact of different dividend and reinvestment policies (and their corresponding yields and returns) on the current share price for all-equity firms using the application of a *constant growth* formula.

What is now termed the *Gordon dividend-growth model* defines the current *ex-div* price of a share by capitalising next year's dividend at the amount by which the shareholders' desired rate of return exceeds the constant annual rate of growth in dividends.

Using Gordon's original notation where K_e represents the equity capitalisation rate; E_1 equals next year's post-tax earnings; b is the proportion retained; (1-b) E_1 is next year's dividend; r is the return on reinvestment and r.b equals the constant annual growth in dividends:

(16) $P_0 = (1-b)E_1 / K_e - rb$ subject to the proviso that $K_e > r.b$ for share price to be finite.

Today, in many Finance texts the equation's notation is simplified with D_1 and g representing the dividend term and growth rate, now subject to the constraint that $K_e > g$

(17) $P_0 = D_1 / K_e - g$

In a *certain world*, Gordon confirms Fisher's relationship between corporate reinvestment returns (r) and the shareholders' opportunity cost of capital (K_e). Share price only responds to profitable investment opportunities and not changes in dividend policy because investors can always borrow to satisfy their income requirements. To summarise the dynamics of Equation (16).

(i) Shareholder wealth (price) will stay the same if r is equal to K_e
(ii) Shareholder wealth (price) will increase if r is greater than K_e
(iii) Shareholder wealth (price) will decrease if r is lower than K_e

Activity 1

To confirm the impact of retention financed investment on share price defined by Gordon under conditions of *certainty*, use the following stock exchange data for Jovi plc with an EPS of 10 pence and a full dividend distribution policy to establish its current share price.

Dividend Yield 2.5%

Now recalculate price, with the same EPS forecast of 10 pence, assuming that Jovi revises its dividend policy to reinvest 50 percent of earnings in projects with rates of return that equal its current yield.

Comment on your findings.

- Full Distribution (Zero Growth)

Without future injections of outside finance, a forecast EPS of 10 pence and a policy of *full distribution* (*i.e.* dividend per share also equals 10 pence) Jovi currently has a *zero growth rate*. Shareholders are satisfied with a 2.5 per cent yield on their investment. We can therefore define the current share price using either a *constant* dividend or earnings valuation for the capitalisation of a *perpetual annuity*, rather than a growth model, because they are all financially equivalent.

$P_0 = E_1 / K_e = D_1 / K_e = 10 \text{ pence} / 0.025 = D_1 / K_e - g = 10 \text{ pence} / 0.025 - 0 = £4.00$

- Partial Distribution (Growth)

Now we have the same EPS forecast of 10 pence but a reduced dividend per share, so that 50 percent of earnings can be reinvested in projects with rates of return equal to the current equity capitalisation rate of 2.5 percent.

According to Gordon, dividends will *grow at a constant rate in perpetuity*. Thus, Jovi's revised current *ex-div* share price is determined by capitalising next year's dividend at the amount by which the desired rate of return exceeds the constant annual growth rate of dividends.

Using Equations (16) or (17):

$P_0 = (1\text{-}b)E_1 / K_e - rb \;=\; P_0 = D_1 / K_e - g \;=\; 5 \text{ pence} / 0.025 - 0.0125 \;=\; £4.00$

- Commentary

Despite abandoning a constant share valuation in favour of the growth model to accommodate a change in economic variables relating to dividends retention, reinvestment and growth, Jovi's share price remains the same.

According to Gordon, this is because movements in share price relate to the profitability of corporate investment opportunities and not alterations to dividend policy. So, if the company's rate of return on reinvestment (r) equals the shareholders' yield (K_e) price will not change. It therefore follows logically that:

(i) Shareholder wealth (price) will only increase if r is greater than K_e
(ii) Shareholder wealth (price) will only decrease if r is lower than K_e

Activity 2

Can you confirm that if K_e = 2.5%, b = 0.5 but r moves from 2.5% to 4.0%, or down to 1.0%, then P_0 moves from £4.00 to £10.00 or £2.50 respectively, just as Gordon's model predicts.

3.2 Gordon's 'Bird in the Hand' Model

Gordon's initial analysis of the determinants of share price depends critically on the assumptions of *certainty*. For example, our previous Activity data incorporated a constant equity capitalisation rate (K_e) *equivalent* to a managerial assessment of a constant return (r) on new projects financed by a constant retention (b). This ensured that wealth remained constant (effectively Fisher's Separation Theorem). We then applied this mathematical logic to demonstrate that share price and hence shareholder wealth stays the same, rises or falls only when:

$$K_e = r; \quad K_e > r; \quad K_e < r$$

But what if the future is *uncertain*?

According to Gordon (1962 onwards) rational, risk averse investors should *prefer dividends earlier, rather than later* (a "bird in the hand" philosophy) even if retentions are more profitable than distributions (i.e. $r > K_e$). They should also prefer *high dividends to low dividends* period by period. Thus, shareholders will discount near dividends and higher payouts at a lower rate (K_{et} now dated) and require a higher overall *average* return on equity (K_e) from firms that retain higher earnings proportions, with obvious implications for share price. Expressed mathematically:

$$K_e = f\,(\,K_{e1} < K_{e2} < \ldots\, K_{en}\,)$$

The equity capitalisation rate is no longer a *constant* but an *increasing* function of the *timing* and *size* of a dividend payout. So, an *increased* retention ratio results in a *rise* in the discount rate (dividend yield) and a *fall* in the value of ordinary shares:

To summarise Gordon's plausible hypothesis in a *world of uncertainty*, where dividend policy, rather than investment policy, determines share price:

The lower the dividend, the higher the risk, the higher the yield and the lower the price.

Review Activity

According to Gordon, the theoretical policy prescription for an *all-equity* firm in a world of uncertainty is unambiguous.

Maximise the dividend payout ratio and you minimise the equity capitalisation rate, which maximises share price and hence shareholder wealth.

But from 1959 to 1963 Gordon published a body of theoretical and empirical work using real world stock market data to prove his "bird in the hand philosophy" with conflicting statistical results.

To understand why, analyse the two data sets below for Jovi plc in a world of *uncertainty*. The first represents a dividend policy of full distribution. The second reflects a rational managerial decision to retain funds, since the company's return on investment exceeds the shareholders' increased capitalisation rate (Fisher's theorem again).

- Explain why the basic requirements of the Gordon growth model under conditions of uncertainty are satisfied.
- Confirm whether the corresponding share prices are positively related to the dividend payout ratio, as Gordon predicts.

Dividend Policy, Growth and Uncertainty

Forecast EPS	Retention Rate	Dividend Payout	Return on Investment	Growth Rate	Overall Shareholder Returns
E_1	(b)	(1-b)	(r)	rb = g	K_e
£0.10	0	1.0	-	-	0.025
£0.10	0.5	0.5	0.075	0.0375	0.050

- The Basic Requirements

Under conditions of *certainty* Gordon asserts that movements in share price relate to the profitability of corporate investment and not dividend policy. However, in a world of *uncertainty* the equity capitalisation rate is no longer constant but an increasing function of the timing of dividend payments. Moreover, an increase in the retention ratio results in a further rise in the periodic discount rate.

So far so good, since our data set satisfies these requirements. Moving from full distribution to partial distribution elicits a rise in K_e even though withholding dividends to finance investment accords with Fisher's wealth maximisation criterion ($r > k_e$) and also satisfies the mathematical constraint of the Gordon growth model ($K_e > rb$).

- Has share price fallen with dividend payout?

Rational, risk averse investors may prefer their returns in the form of dividends now, rather than later (a "bird in the hand" philosophy that values them more highly). But using the two data sets, which satisfy all the requirements of the Gordon model under conditions of uncertainty, reveals that despite a change in dividend policy, share price remains unchanged!

Uncertainty, *Differential* Dividend and Growth Rates with a *Uniform* Price: $P_0 = (D_1/K_e\text{-}g) = £4.00$

Forecast EPS E_1	Retention Rate (b)	Dividend Payout (1-b)	Return on Investment (r)	Growth Rate rb = g	Overall Shareholder Returns Ke
£0.10	0	1.0	-	-	0.025
£0.10	0.5	0.5	0.075	0.0375	0.050

Summary and Conclusions

The series of variables in the previous table were deliberately chosen to ensure that share price remained unchanged. But the important point is that they all satisfy the requirements of Gordon's model, yet contradict his prediction that share price should fall. Moreover, it would be just as easy to provide another data set that satisfies these requirements but produces a rise in share price. No wonder Gordon and subsequent empirical researchers have often been unable to prove with statistical significance that *real world equity values* are:

Positively related to the dividend payout ratio
Inversely related to the retention rate
Inversely related to the dividend growth rate

Explained simply, Gordon confuses dividend policy (*financial risk*) with investment policy (*business risk*). For example, an increase in the dividend payout ratio, without any additional finance, reduces a firm's operating capability and *vice versa*.

Using Equation (17)

$$P_0 = D_1 / K_e - g$$

the weakness of Gordon's hypothesis is obvious. Change D_1, then you change K_e and g. So, how do investors unscramble their differential effects on price (P_0) when all the variables on the *right hand side* of the equation are now affected? And in our example cancel each other out!

For the moment, suffice it to say that Gordon encountered a very real world problem when testing his theoretical model empirically. What statisticians term *multicolinearity*. Fortunately, as we shall discover, two other academic researchers were able to provide the investment community with a more plausible explanation of the determinants of share price behaviour.

Selected References

1. Fisher, I., *The Theory of Interest*, Macmillan (New York), 1930.
2. Gordon, M. J., *The Investment, Financing and Valuation of a Corporation,* Irwin, 1962.

4 Dividend Irrelevancy

Introduction

Under conditions of *certainty*, the Gordon growth model ($P_0 = D_1 / K_e - g$) reveals why movements in share price relate to the profitability of a company's investment policy (business risk) and not variations in dividend policy (financial risk).

In a world of *uncertainty*, Gordon then explains why movements in share price relate to corporate dividend policy. Rational, risk-averse investors prefer their returns in the form of dividends now, rather than later (a "bird in the hand" philosophy).

The purpose of this Chapter is to evaluate an alternative hypothesis developed by the joint Nobel Prize winning economists, Franco Modigliani and Merton H. Miller (MM henceforth). Since 1958, their views on the *irrelevance of dividend policy* when valuing shares based on the economic "law of one price" have defined the development of modern finance.

4.1 The MM Dividend Irrelevancy Hypothesis

MM (1961 onwards) criticise the Gordon growth model under conditions of uncertainty supported by a wealth of empiricism, most recently the consultancy work of Stern-Stewart referenced by the author in *Strategic Financial Management* (*op cit*). According to MM, dividend policy is not a determinant of share price in reasonably efficient markets because dividends and retentions are *perfect economic substitutes*.

If *shareholders* forego a current dividend to benefit from a future retention-financed capital gain, they can still create their own *home made* dividends to match their consumption preferences by the sale of shares or personal borrowing and be no worse off.

If a *company* chooses to make a dividend distribution, it too, can still meet its investment requirements by a new issue of equity, rather than use retained earnings. So, the effect on shareholders' wealth is also neutral.

Consequently, *business risk*, rather than *financial risk*, defines all investors and management need to know about corporate economic performance.

Theoretically and mathematically, MM have no problem with Gordon under conditions of *certainty*. Their equity capitalisation rate (K_e) conforms to the company's class of business risk. So, as Fisher predicts (1930) share price is a function of variations in profitable corporate investment and not dividend policy. But where MM depart company from Gordon is under conditions of *uncertainty*.

As we explained in Chapter Three, Gordon confuses dividend policy with investment policy. For example, an increase in the dividend payout ratio, without any additional finance, reduces a firm's operating capability and *vice versa*. MM also assert that because uncertainty is *non-quantifiable*, it is logically impossible to capitalise a *multi-period* future stream of dividends, where $K_{e1} < K_{e2} < K_{e3}$ ...*etc.* according to the investors' perception of the unknown.

MM therefore define a current *ex-div* share price using the following *one period* model, where K_e equals the shareholders' desired rate of return (capitalisation rate) relative to the "quality" of a company's periodic earnings (class of business risk). The greater their variability, the higher the risk, the higher K_e, the lower the price and *vice versa*.

(18) $P_0 = D_1 + P_1 / 1 + K_e$

MM then proceed to prove that for a *given* investment policy of *equivalent* business risk (where K_e remains constant) a change in dividend policy cannot alter current share price (P_0) because:

- The next ex-div price (P_1) only increases by any corresponding reduction in dividend (D_1) and vice versa.

Activity 1

To illustrate MM's dividend irrelevancy hypothesis, let us reinterpret the stock exchange data for Jovi plc, initially applied to Gordon's growth model in Chapter Three.

- With an EPS of 10 pence a full dividend distribution policy and yield of 2.5 per cent, establish Jovi's current *ex-div* share price using Equation (18).
- Now recalculate this price, with the same EPS forecast of 10 pence, assuming that Jovi revises its dividend policy to reinvest 100 percent of earnings in future projects with rates of return that equal its current yield.

With a policy of *full* dividend distribution, MM would define:

(18) $P_0 = D_1 + P_1 / 1 + K_e = £0.10 + £4.00 / 1.025 = £4.00$

Refer back to Chapter Three and you will discover that this *ex-div* price is *identica*l to that established using the Gordon growth model.

Turning to a policy of *nil* distribution (*maximum* retention) where profits are reinvested in projects of equivalent business risk (*i.e.* 2.5 per cent):

(18) $P_0 = D_1 + P_1 / 1 + K_e = £0 + £4.10 / 1.025 = £4.00$

According to MM, because the managerial cut-off rate for investment still equals K_e, the *ex-div* price rise matches the fall in dividend exactly, leaving P_0 unchanged.

You might care to confirm that using the Gordon growth model from the previous Chapter:

(17) $P_0 = D_1 / K_e - g = 0$

In other words, if a company does not pay a dividend, which is not unusual (particularly for high-tech growth firms), it is not possible to determine a share price.

4.2 The MM Hypothesis and Shareholder Reaction

You will also recall from Chapter Three that even if Gordon's model is mathematically definable (K_e>g as well as D_1>0) he argues that a *fall* in dividends should produce a *rise* in the equity capitalisation rate, causing share price to *fall*. However, MM *refute* this argument.

If a company's reduction in dividends fails to match shareholders' expectations, they can always create *home-made* dividends by selling part of their holdings (or borrowing) to satisfy their consumption preferences, without affecting their overall wealth.

To understand MM's proposition, let us develop the data from Activity 1 using Equation (18) assuming that the number of shares currently owned by an individual shareholder is defined by (n) to represent their holding.

(19) $nP_0 = nD_1 + nP_1 / 1 + K_e$

Activity 2

Assume you own a number of shares (n = 10,000) in Jovi plc and expect an initial policy of full dividend distribution. From the previous Activity and Equation (19) it follows that your current stock of wealth is worth:

$$nP_0 = nD_1 + nP_1 / 1 + K_e = £1{,}000 + £40{,}000 / 1.025 = £40{,}000$$

Now assume that the firm withholds all dividends for reinvestment. What do you do, if your income requirements (consumption preferences) equal the dividend foregone (£1,000)?

According to MM, the *ex-div* price should increase by the reduction in dividends. So, your holding is now valued as follows, with no overall change:

(19) $nP_0 = nD_1 + nP_1 / 1 + K_e = £0 + £41{,}000 / 1.025 = £40{,}000$

However, you still need to satisfy your income preference for £1,000 at time period one.

So, why not sell 250 shares for £41,000 / 10,000 at £4.10 each?

You now have £1,025, which means that you can take the income of £1,000 and reinvest the balance of £25 on the market at your desired rate of return (K_e=2.5%). And remember you still have 9,750 shares valued at £4.10.

To summarise your new stock of wealth:

Shareholding 9,750: Market value £39,975: Homemade Dividends £1,000: Cash £25

Have you lost out?

According to MM, *of course not*, since future income and value are unchanged:

	£
nP_1 = 9,750 x £4.10	39,975
Cash reinvested at 2.5%	25
Total Investment	40,000
Total annual return at 2.5%	1,000

To summarise, MM conclude that if *shareholders do not like the heat they can get out of the kitchen* by selling an appropriate proportion of their holdings, borrowing (or lending) to match their consumption (income) preferences.

4.3 The MM Hypothesis: A Corporate Perspective

Let us now turn to the company and what is now regarded as the *proof* of the MM dividend irrelevancy hypothesis. Usually, it is lifted *verbatim* from the mathematics of their original article and relegated to an Appendix in the appropriate chapter of most modern financial texts, with little, if any, numerical explanation.

So, where do we start?

According to MM, dividends and retentions are *perfect economic substitutes*, leaving shareholder wealth unaffected by changes in distribution policy. For its part too, a firm can resort to new issues of equity to finance any shortfall in its investment plans without compromising its current *ex-div* price.

To illustrate MM's *corporate* proposition, assume a firm's total number of shares currently in issue equals (n). We can define its *total market capitalisation of equity* as follows:

(19) $nP_0 = nD_1 + nP_1 / 1 + K_e$

Now assume the firm decides *to distribute all earnings as dividends.* If investment projects are still to be implemented, the company must therefore raise new equity capital equivalent to the proportion of investment that is no longer funded by retentions.

According to MM, the number of new shares (m) issued at an ex-*div* price (P_1) must therefore equal the total dividend per share retained (nD_1) defined by:

(20) $mP_1 = nD_1$

Based on all shares *outstanding* at time period one ($nP1+mP_1$) MM then rewrite Equation (19) to represent the total market value of *original* shares in issue as follows:

(21) $nP_0 = 1/ K_e [nD_1 + (n + m) P_1 - mP_1]$

And because $mP_1 = nD_1$ this equation simplifies to:

(22) $nP_0 = 1/ K_e (n + m) P_1$

MM therefore conclude that because the dividend term disappears from their market capitalisation, it is impossible to assert that share price is a function of dividend policy.

To illustrate the *corporate* dynamics of MM's argument, let us develop the data from Activity 2, using the preceding equations where the company's total number of shares in issue equals (n).

Activity 3

Assume Jovi plc begins the period with a *maximum* retention policy (*nil* distribution) and a given investment policy. Shares are therefore valued currently at £4.00 with an *ex-div* price of £4.10 at time period one as follows:

(18) $P_0 = D_1 + P_1 / 1 + K_e$ = £0 + £4.10 / 1.025 = £4.00

If Jovi has one million shares in issue, we can also derive the company's *total market capitalisation of equity:*

(19) $nP_0 = nD_1 + nP_1 / 1 + K_e$ = £0 + £4.1m / 1.025 = £4m

But now assume that the firm decides *to distribute all earnings as dividends* (10 pence per share on one million issued) without compromising investment (*i.e.* it is still a "given")

Confirm that this policy leaves Jovi's share price unchanged, just as MM hypothesise.

If investment projects are still to be implemented, the company must raise new equity capital equal to the proportion of investment that is no longer funded by retained earnings. According to MM, the number of new shares (m) issued *ex-div* at a price (P_1) must therefore equal the total dividend per share retained (nD_1) defined by the following equation.

(20) $mP_1 = nD_1$ = £100,000

Based on all shares *outstanding* at time period one ($nP1+mP_1$) we can rewrite Equation (19) representing the total market value of *original* shares in issue as follows:

(21) $nP_0 = 1/ K_e [nD_1 + (n + m) P_1 - mP_1]$

This simplifies to the following equation where *the dividend term disappears*.

(22) $nP_0 = 1/ K_e (n + m) P_1 = 1/ 1.025 (nP_1 + £100,000) = £4$ million

Since there is also only one unknown in the equation (P_1) dividing through by the number of shares originally in issue (n = one million) and rearranging terms, we revert to:

(18) $P_0 = D_1 + P_1 / 1 + K_e = P_1 + £0.10 / 1.025 = £4.00$

And simplifying, then solving for P_1:

$$P_1 = £4.00$$

Thus, as MM hypothesise:

- The *ex-div* share price at the end of the period has fallen from its initial value of £4.10 to £4.00, which is exactly the same as the 10 pence rise in dividend per share, therefore leaving P_0 unchanged.
- Because the dividend term has disappeared from the equations, it is impossible to conclude that share price is a function of dividend policy.

Review Activity

To reaffirm the logic of the MM dividend irrelevancy hypothesis, revise the Jovi data set for a *nil* distribution to assess the implications for both the shareholders and the company if management now adopt a policy of *partial* dividend distribution, say 50 per cent?

Summary and Conclusions

MM criticise the Gordon growth model under conditions of uncertainty from both a *proprietary* (shareholder) and *entity* (corporate) perspective. The current value of a firm's equity is *independent* of its dividend distribution policy, or alternatively its retention policy, because they are *perfect economic substitutes:*

- The *quality* of earnings (business risk), rather than how they are *packaged* for distribution (financial risk), determines the shareholders' desired rate of return and management's cut-off rate for investment (project discount rate) and hence its share price.
- If a company *chooses* to make a dividend distribution it can always meet its investment requirements by a new issue of equity, rather than use retained earnings, so that the effect on shareholders' wealth is neutral.
- As a corollary, dividend policy should therefore be regarded as a *passive residual*, whereby management return unused funds to shareholders (the *agency* principle) because their search for new investment opportunities cannot maintain shareholder wealth.

It therefore seems reasonable to conclude Part Two with the following practical observation on our analyses of share valuation theories.

The P/E ratios associated with *business risk*, rather than dividend yields associated with *financial risk*, which are published in the financial press that we first outlined in Chapter Two, should encapsulate all the investment community needs to know about corporate economic performance.

We shall see.

Selected References

1. Gordon, M. J., *The Investment, Financing and Valuation of a Corporation,* Irwin, 1962.
2. Miller, M. H. and Modigliani, F., "Dividend policy, growth and the valuation of shares", *The Journal of Business of the University of Chicago*, Vol. XXXIV, No. 4 October 1961.
3. Hill, R.A., *Strategic Financial Management, bookboon.com* (2008).
4. Fisher, I., *The Theory of Interest*, Macmillan (New York), 1930.

Part Three: A Guide to Stock Market Investment

5 How to Read Stock Exchange Listings

Introduction

Normative capital theory maintains that if company accepts projects with a positive NPV, financed by retentions or equity issues discounted at their shareholders' current rate of return, the market value of shares should rise by an amount equal to the NPV. Rational, risk-averse investors will regard the company's shares as a "good buy" with the result that increased demand forces up their price. Eventually a new *equilibrium* point is established, which maximises share price with a yield equal to investments of comparable risk elsewhere on the market.

Of course, the price of shares can fall as well as rise. If shareholders are generally satisfied with their return, given the risk a firm is taking, they will hold on to their investment. Price and yield therefore remain stable. However, if they are dissatisfied, they will attempt to sell their holding. But with little demand, price will fall and return rise to compensate new investors for increased risk. As we observed in Part Two:

A basic stock market law is the *higher* the risk, the *lower* the price, the *higher* the yield and *vice versa*.

These risk-return relationships between price and yield explain why a few select ratios published daily in the financial press are used extensively by the global investment community to analyse stock market performance. The purpose of this chapter is to develop our understanding of the phenomena as a guide to future investment.

5.1 Stock Exchange Listings

Corporate performance is not an *absolute* but *relative*. It must be related to some *standard of comparison*. A share's price is only meaningful if you know other data about a company, and then place it in context. When buying or selling shares you must also remember that recent stock market activity may be the exception, rather than the rule. So, how do you acquire this information and what can it tell you?

Fortunately, help is at hand in the share price columns of the financial press provided by global stock exchanges. These enable investors to analyse a company's vital statistics, or compare them with those for similar companies, on world markets over time.

The publication of stock exchange listings can be traced back to Charles H. Dow, the first editor of the Wall Street Journal, who started to compile daily share price averages in 1897. These are still manifest in the best known barometer of stock market performance, the Dow-Jones Industrial Index. In the UK, the Financial Times (FT) performs a similar function and calculates a variety of indices for the London Stock Exchange (LSE) such as the FT-SE 100. For the purpose of exposition, let us focus on the LSE.

The *FT London Share Service* publishes individual share price information in the Financial Times on Tuesdays through to Saturdays. Each day, companies are listed alphabetically within each business sector (such as Electricals) with data on each share given in ten columns. Other UK newspapers provide a more selective analysis. For example, the Daily Mail carries a reasonably simple five-column guide to share prices and the Sunday Times Business Section a seven-column listing. To shed light on these and other equity data worldwide, let us consider some typical information for a hypothetical newspaper and company expressed in pence (£ sterling).

2013		Company	Price	Change	Dividend	Cover	Yield	P/E	Mkt. Cap
High	Low			+ or -	net		gross		
175	150	Coldplay	200	+5	8	2.5	5	10	£100m

(1) **Prices**

The first two columns show the highest and lowest prices in pence for the ordinary shares (common stock) during the year. Early in the year these prices will be the extremes from the previous year. So, in February 2013 you will be reading highs and lows since 1 January 2012.These place the current price in perspective.

In our example, the share has had a good run recently and exceeds the year's high point. Compare this with the market as a whole, or similar shares in similar industries and you can establish whether it is following a trend. But before purchasing shares, remember the biggest winners are sometimes the biggest losers. Price movements might be based on *speculation*, rather than any *intrinsic* value underpinned by actual profits, or other trading fundamentals and the bubble may be about to burst. As we explained in Chapter One, astute investors will have bought low, waiting to sell high, which can then create "crowd" behaviour in the form of a selling frenzy, causing individual share prices to plummet and even markets to crash (think dot.com 2000).

Next in our listing is the name of the company (Coldplay) followed by the share's current *ex-div* price in pence at the end of the day's trading on the previous day. This is in fact the *middle* value, which is halfway between the price at which shares were bought and sold. In the next column there is a figure preceded by a plus or minus sign to show how the share price moved, if at all, during the day.

If you then jump to the last column, the total market value of the company (price per share multiplied by the number in issue) is represented by the *market capitalisation* of equity. The higher the value, the higher the firm is ranked in the stock exchange listing. Note, however, that this is only a *size* criterion and not a *performance* measure. Large companies can still make losses (remember BP?) whilst those with a smaller capitalisation may be extremely profitable, as we shall discuss in Chapter Six.

(2) **Dividends**

Returning to the sixth column, dividends are introduced. Normally, the figure given is the total *net* dividend per share for the latest year because income tax is deducted at the basic rate (assumed here to be 20 per cent). Sometimes the dividend shown is the company's own forecast of its next dividend, which is a useful indicator of the company's confidence concerning future performance.

Next is the *dividend cover*. This is a simple measure of *financial* risk that reveals the maximum number of times a company's dividend (the amount of profits distributed to shareholders) could be paid out of post-tax earnings. Since our company has paid a dividend of 8 pence per share that is covered 2.5 times, it therefore has sufficient earnings to pay 20 pence per share. As a general rule, dividends covered twice are desirable.

- A dividend well covered by profits is normally a secure dividend
- Conversely, low dividend cover might indicate difficulty in maintaining future payouts.

Like price, it is useful to compare one company with others of similar risk, to see if it is bucking the trend.

Column eight shows the *gross yield*. This defines the annual *percentage* return shareholders receive on every £100 invested, before tax is deducted at their basic rate. This is calculated using the latest dividend (gross) divided by the current *ex-div* market price.

A dividend *yield* differs from the dividend *percentage* published in company accounts. The latter conforms to *historical* cost convention and *generally accepted accounting principles* (GAAP). It is calculated using the *nominal* or *par* value of ordinary shares (common stock) which is a *constant*. Thus, we cannot say that an improvement in a company's dividend percentage, or a company with a higher dividend percentage than its competitors, represents a more attractive investment. A correct interpretation depends upon the price at which shares were acquired in relation to their latest *market* value.

For example, if you bought 100 ordinary shares at a nominal value of £1.00 in a company that pays a dividend percentage of ten per cent, its yield would also be ten percent. It provides a return of £10 on every £100 invested in the company. However, should those shares double in price, the value of your holding and the price paid by new investors would now be £200. If the dividend percentage was still held at ten percent, the revised yield would be precisely half the dividend percentage, since the market value is now twice the nominal value. You still earn ten percent on your original investment. However, with a yield of only five percent you might consider selling the shares, taking the capital gain and moving your funds elsewhere. But note the following, again part of stock market law:

- A relatively low dividend yield can suggest that investors believe a company's prospects are good and dividends are expected to grow in the future, i.e. share price is buoyant.
- A relatively high yield (low price) may indicate risk concerning a company's growth and ability to sustain dividends.

Remember, that without prospective capital gains, rational risk-averse investors might also require a higher current return if they are to buy shares (a "bird in the hand" strategy). A lower yield can also mean that the dividend has been cut.

(3) **The Price-Earnings Ratio**

In our example, the ninth column, entitled P/E, is the price-earnings ratio, which is a *valuation multiplier* expressed as a *whole* number. You will recall from Part Two that it is the *reciprocal* of the earnings yield based on post-tax earnings. The P/E rates a company's share price as a *multiple* of profits, rather than the percentage return it earns. For our company, a P/E of ten corresponds to a yield of 10 percent, which means that the total value of a company's shares (the market capitalisation, in the last column) is ten times its annual post-tax profits. Alternatively, the P/E may be calculated by dividing current share price by latest reported earnings per share (EPS).

At this point it is also worth noting what a P/E tells investors about corporate performance that an EPS cannot. EPS is calculated by dividing net distributable profits by the number of shares in issue. So, if EPS is higher this year then the company is presumably performing better because profits are growing. Existing investors might therefore be inclined to hold on to their investment, or even increase their stake in the firm. However, just like a reliance on a dividend percentage (rather than a yield) is misguided, so too is the use of EPS at the expense of a P/E.

The validity of both strategies depends upon the price at which shares were trading when they were originally acquired, relative to their current market value. For example, if the price of a company's shares has risen faster than its EPS over the last twelve months, then the shareholders' *real* rate of return will have fallen and the P/E will have risen proportionately. Thus, shareholders might consider selling their holdings to reap the capital gain and invest elsewhere at a lower price for a higher return (*i.e.* lower P/E).

Given a company's latest reported profit figures, we can also use existing P/E ratios for similar firms to place a comparative value on that company's shares. This can then be compared with its actual total market capitalisation or the current share price to establish whether the company is either undervalued, equitable, or overvalued, relative to the market for similar shares. Undervalued, investors buy, equitable they hold, overvalued they sell, no more so than when the market collapsed with the 2007 banking crisis.

Based on the Modigliani-Miller (MM) dividend irrelevancy hypothesis explained in the previous Chapter, many investors (institutional or otherwise) believe that the P/E ratio encapsulates all the factors which determine the price of a company's shares, irrespective of its distribution policy (dividend yield).

- A high P/E suggests that the company is highly rated and shares are sought after, (but note this could mean they are relatively expensive and not necessarily a bargain buy)
- Conversely, a low P/E might reflect that a company's shares are undervalued by the `market relative to its profit performance.

But remember, the true significance of a P/E ratio (like price data and dividends) can only be judged in relation to other companies in the same line of business. If the *median* P/E for a similar group of companies was eight, then the ratio of ten for our particular company might suggest that its shares are in great demand because a rapid growth in earnings was anticipated. Conversely, if the market multiplier was fifteen this might indicate our company has poor growth prospects and is not greatly favoured by investors.

In certain circumstances the P/E ratio also stands alone as a valuation tool. For example, if a company's distribution policy is too erratic as a basis for capitalisation, or it pays little or no dividend. This does not mean the shares are unattractive. On the contrary, the P/E might be high because there is an active market among investors who pay income tax on dividends at higher rates. Such a clientele would be interested in minimising their tax liability *via* future capital gains, because they are usually taxed at lower rates, rather than receive regular income.

Review Activity

We dealt with the mathematical relationship between the earnings yield and P/E ratio in the Review Activity for Chapter Two. But if you are still unsure about this, refer back, paying particular attention to Table 2.1.

You will also recall from Part Two that the P/E ratio can be calculated by dividing the price of a share by the company's latest earnings per share (EPS). Thus, with a total market capitalisation of £100 million and a share price of £2.00 (50 million shares in issue) from our profile for Coldplay:

Confirm that with a P/E of 10, the company's net profit is £10 million, which is equivalent to an EPS of 20 pence.

Summary and Conclusions

The interpretation of stock market data is rather like studying the handicap and form for a horse race. Share price listings also contain a vocabulary all of their own, which can seem like a foreign language to the uninitiated. Fortunately, financial gurus, such as the legendary investors Warren Buffet in the States and Jim Slater in the UK, have long thrown lifelines to investors before they dive into the stock market. Seek out their publications and you will discover investment strategies designed "to beat the system" using public information, such as share price listings, corporate and analyst reports, plus press, media and internet comment. Invariably, their advice explains how to "hedge" your bets in the presence of risk, beginning with a fundamental "stock market law".

The higher the dividend yield, or the lower the P/E ratio, or the lower the dividend cover: then the higher the financial risk and lower the price of an investment (and *vice versa*).

In the latest edition of his best seller, *Beyond the Zulu Principle* (2011) legendary UK investor Jim Slater expands upon his "golden rules for investment" based on analyses of stock market criteria. He likens these criteria to an investor's "quiverful of arrows". They need not be fired all at once, some may miss their target altogether, but hopefully, you will score a substantial number of bull's eyes.

Using his pragmatic approach, the following guide to stock market prices based on this Chapter's analysis is not guaranteed to make you rich. But it should make share trading easier.

- The P/E ratio (earnings yield reciprocal) shows how a company's value is rated in relation to the profit it earns. The higher the P/E ratio, the greater confidence there is that profits are going to rise and the lower the P/E, the greater the concern that it might be unable to sustain profits.
- Conversely, a low P/E ratio could reflect the fact that a company's shares are undervalued by the market relative to its profit performance and thus make it attractive to speculative investors.
- Shares in companies that are expected to produce rapid growth in profits and hence capital gains, offer lower dividend yields, while higher dividend yields are offered by what are regarded as relatively mature, stable "blue chip" businesses with little prospect of increasing profits and dividend.
- Conversely, part of stock market law is "the higher the yield the higher the risk". This applies particularly to shares where a higher dividend yield usually signals uncertainty over whether the dividend can be

maintained in future, particularly if earnings cover is low.

- In general, if any investment offers either a higher dividend yield or earnings yield (a low P/E ratio) than similar investments, it is advisable to be cautious, unless the market hits rock bottom, (for example the crash of 1987).

Of course, there have always been exceptions to these rules. A yield may be high (or a P/E ratio low) not because investors pay less for risky dividends (or earnings) but because the company has been overlooked by the market and is genuinely undervalued. This is why Slater developed sophisticated analyses based on the P/E and growth prospects (more of which later). The rules have also broken down spectacularly since the 1980's.

Apart from the 2007 banking fiasco, consider the dot.com-techno crash of 2000-01. With no shortage of naïve investors tracking pure speculation (crowd behaviour) prior to the millennium, many techno-companies reported nil-dividends (zero yields) nil-earnings (no P/E), or alternatively, huge P/E ratios (sky-high prices with miniscule earning earnings) and no cover.

So, familiarise yourself with the financial press and other source material. Use them consistently. But remember, that in an imperfect capital market (which also includes an imperfect market for information) it can sometimes pay to follow your own instincts and not the crowd.

Selected References

Slater, J., *Beyond the Zulu Principle,* Harriman Press (2011).

Appendix: Stock Market Ratios

1. Ordinary Share Values

$$\text{Nominal value (or Par value)} = \frac{\text{Dividend yield x Market value}}{\text{Dividend \%}}$$

$$\text{Market Value} = \frac{\text{Nominal value x Dividend \%}}{\text{Dividend yield}}$$

2. Dividend measures (before deduction of income tax)

$$\text{Dividend per share} = \frac{\text{Total dividend (gross)}}{\text{Number of shares}}$$

Or Nominal value x Dividend %

$$\text{Dividend percentage} = \frac{\text{Dividend yield x Market value}}{\text{Nominal value}}$$

$$\text{Or} \quad \frac{\text{Dividend per share}}{\text{Nominal value of an ordinary share}}$$

$$\text{Or} \quad \frac{\text{Total dividends (gross)}}{\text{Total nominal value of issued ordinary shares}}$$

$$\text{Dividend Yield} = \frac{\text{Nominal value x Dividend \%}}{\text{Market value}}$$

$$\text{Or} \quad \frac{\text{Dividend per share x 100}}{\text{Market value of an ordinary share}}$$

$$\text{Or} \quad \frac{\text{Total dividend x 100}}{\text{Total market value of ordinary shares (i.e. market capitalisation)}}$$

5. Earning Measures (net of corporation tax)

$$\text{Return on capital employed (ROCE)} = \frac{\text{Profits after tax minus preference dividend (gross) x 100}}{\text{Balance sheet value of ordinary shares plus reserves}}$$

$$\text{Earnings per share (EPS)} = \frac{\text{Profits after tax and preference dividend (gross)}}{\text{Number of shares}}$$

$$\text{Earnings Yield} = \frac{\text{Earnings per share x 100}}{\text{Market value of an ordinary share}}$$

$$\text{Or} \quad \frac{\text{Profits after tax and preference dividends (gross) x 100}}{\text{Market capitalisation}}$$

$$\text{Price/ Earnings ratio (P/E)} = \frac{1}{\text{Earnings yield}}$$

$$\text{Or} \quad \frac{\text{Market value of an ordinary share}}{\text{Earning per share}}$$

$$\text{Or} \quad \frac{\text{Market capitalisation}}{\text{Profits after tax and preference dividend (gross)}}$$

6. The Relationship Between Dividends and Earnings

$$\text{Dividend cover} = \frac{\text{EPS}}{\text{Dividend per share}}$$

$$\text{Or} \quad \frac{\text{Profits after tax and preference dividends (gross)}}{\text{Total dividend}}$$

$$\text{Dividend payout ratio} = \frac{1}{\text{Dividend cover}} \times 100$$

$$\text{Or} \quad \frac{\text{Dividend per share}}{\text{EPS}} \times 100$$

$$\text{Or} \quad \frac{\text{Total dividends}}{\text{Profit after tax and preference Dividends (gross)}} \times 100$$