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Corporate Valuation and Takeover: Exercises

Robert Alan Hill

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Exercises

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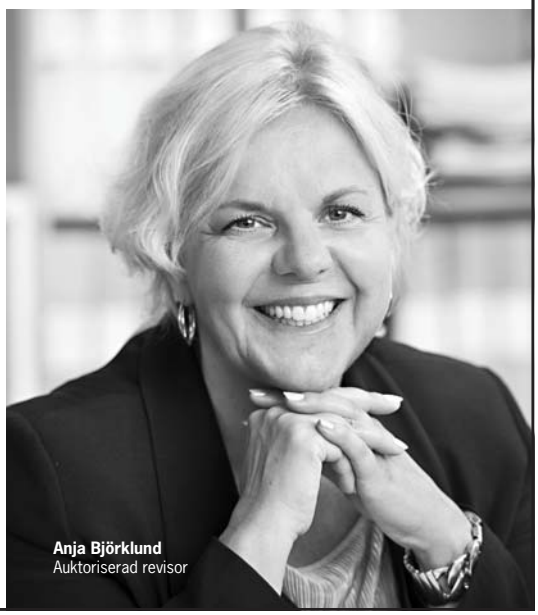

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About the Author

With an eclectic record of University teaching, research, publication, consultancy and curricula development, underpinned by running a successful business, Alan has been a member of national academic validation bodies and held senior external examinerships and lectureships at both undergraduate and postgraduate level in the UK and abroad.

With increasing demand for global e-learning, his attention is now focussed on the free provision of a financial textbook series, underpinned by a critique of contemporary capital market theory in volatile markets, published by bookboon.com.

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Corporate Valuation and Takeover: Exercises

This free book of Exercises reinforces theoretical applications of stock market analyses as a guide to *Corporate Valuation and Takeover* and other texts in the bookboon series by Robert Alan Hill. The volatility of global markets and individual shares, created by serial financial crises, economic recession and political instability means that investors (private, institutional, or corporate) cannot rely on "number crunching". All market participants need a thorough understanding of share valuation models (whether asset, earnings, dividend and cash based) to comprehend the factors that determine their future trading decisions.

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Part I: An Introduction

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1 An Overview

Introduction

Having read *Corporate Valuation and Takeover* (2011) or any other texts from the author's bookboon series referenced at the end of this Chapter, you should have a critical understanding of how financial securities and companies are valued. In this free compendium of Exercises we shall reinforce the theory and application of stock market analysis as a guide to further reading.

Armed with the *Corporate Valuation and Takeover* companion text (*CVT* henceforth) you should have no *conceptual* problems with the following material. But remember the concepts need to be *applied* and we live in extremely difficult times where more than ever, past performance may be no guide to the future.

Since the millennium dot.com crash, every year has been dramatic for stock market participants. After a five year "bull" run followed by global banking meltdown in 2007-8, economic recession has seen a number of Western governments (including America) unable to repay their debts and their credit status downgraded.

The subsequent eurozone credit crisis saw the departure of four European prime ministers in late 2011 (Greece, Italy, Ireland and Spain) and the credit rating of Portugal reduced to "junk" status in early 2012. With tighter stock market regulation, increased International Monetary Fund (IMF) and central banking intervention, investors (institutional or otherwise) continue to make provision for massive losses, which imposes a huge restriction on stock market liquidity worldwide.

To reflect these events, we will consider a number of worst case scenarios where appropriate. The Exercises will also compare ideal investment decisions with those to be avoided. But remember these are only *hypothetical* examples.

A Guide to Further Study

To keep up to speed with *real world* events as they unfold, I suggest that you acquire *informed comment* from quality newspapers, financial websites, corporate and analyst reports, plus any topical material that you come across as you trawl the Internet during your studies. Do read share price listings looking for trends based on the stock market ratios explained in *CVT* and summarised in the Appendix to this text (price, yield, cover and the price-earnings ratio).

Focus on a few companies of your choice. Look back over a number of years to get a feel for how they have moved within the context of the market. Pay particular attention to company profit warnings, analyst downgrades, director share dealings, takeover activity and rumour. This research need not be too formidable, particularly if you are studying with friends and have *CVT* for reference.

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Modern Finance: A Review

Part One of *CVT* explains why contemporary financial analysis is not an exact science and the theories upon which it is based may even be "bad" science. The fundamental problem is that economic decisions are characterised by *hypothetical* human behaviour in a *real* world of uncertainty. Thus, theoretical financial models may be logically conceived. But all too often, they are based on hypotheses underpinned by *simple assumptions* that rationalise the *complex world* we inhabit with little *empirical support*. At best they may support your conclusions. But at worst they may invalidate your analysis.

Yet as we observed, most modern theorists, academics and analysts still cling to the simplistic *normative* objective of shareholder wealth maximisation based on "rational" investment decisions, premised on NPV maximisation techniques designed to deliver the highest absolute profit. Underpinned by the Separation Theory of Fisher (1930) that assumes *perfect* capital markets, characterised by freedom of information and no barriers to trade:

> Shares are always correctly priced by the market at their true *intrinsic* value. The consumption (dividend) preferences of all shareholders are satisfied by the *rational* managerial investment policies of the company that they own, based on the *agency* principle formalised by Jenson and Meckling (1976).

Even when modern financial theory moves from a risk-free world to one of uncertainty, Fisherian analysis remains the bedrock of rational investment. Statistically, it defines how much return you can expect for a given level of risk, assuming project or stock market returns are linear *random variables* that conform to a "normal" distribution. For every level of risk, there is an investment with the highest expected return. For every return there is an investment with the lowest expected risk. Using mean-variance analysis, the standard deviation calibrates these risk-return trade-offs. Corporate wealth maximisation equals the maximisation of investor *utility* using *certainty equivalence* associated with the expected NPV (ENPV) maximisation of all a firm's projects.

According to Modern Portfolio Theory (MPT) based on the pioneering work of Markovitz (1952), Tobin (1958) and Sharpe (1963) if different investments are combined into a portfolio, management (or any investor) with the expertise can also plot an "efficiency frontier" to select any investment's trade-off according to their desired risk-return profile (utility curve) relative to the market as a whole.

So far so good, but what if capital markets are *imperfect*, information is not freely available and there are barriers to trade? Moreover, what if corporate management and financial institutions pursue their own agenda characterised by short-term goals at the expense of long-run shareholder wealth maximisation, as the previous decade's catastrophic events suggest? Are shares still correctly priced and are financial resources still allocated to the most profitable investment opportunities, irrespective of shareholder consumption preferences. In other words, are markets *efficient* once the agency principle breaks down?

Like all my other texts in the bookboon series, *CVT* suggests they are not. *Post-modern* theorists with their cutting-edge mathematical expositions of speculative bubbles, catastrophe theory and market incoherence, believe that investment returns and prices may be *non- random* variables and 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 the investment community with alternative guidance in their quest for greater wealth.

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Nevertheless, *post-modernism* serves a dual purpose. First, it justifies why the foundations of traditional finance may indeed be "bad science" by which we mean that theoretical investment and financing decisions are all too often based on simplifying assumptions without any empirical support. Second, it explains why the investment community still works with *imperfect theories*. As a consequence, it reveals why they should always interpret their results with caution and not be surprised if subsequent events invalidate their conclusions.

Exercise 1: Corporate Valuation and Takeover: A Review

We have seriously questioned the traditional assumptions of *perfect* markets, the *agency* principle and the strength of real world *efficiency* that underpin comparative analyses of supposedly *random* prices and returns by *rational*, risk-averse investors. Nevertheless, they still provide indispensible, theoretical benchmarks for any framework of investment, postmodern or otherwise, first formalised as the Efficient Market Hypothesis (EMH) by Eugene Fama (1965)

Required:

Because of its pivotal role in the remainder of this study, you should refer to the details of the EMH explained in Part One of *CVT* and before we proceed:

Briefly define "efficiency" and consider the implications of the EMH for the purposes of valuation and takeover.

An Indicative Outline Solution

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

Efficiency and its strength (weak, semi-strong or strong) are determined by the increasing speed with which the stock market and its participants assimilate new information into the price of financial securities, such as a share.

Historical evidence suggests that investor decisions and government policies are based on the assumption of *semi-strong* efficiency. Hence, the absence of tight market regulation.

Rational 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.

The market implications of the EMH relevant to valuation and takeover can be summarised as follows:

- If efficiency is semi-strong, or strong, speculative investment is pointless without the advantage of "insider" information.
- In the short term "you win some and you lose some".
- In the long run, you cannot "beat the market". Investment is a *zero sum game* that delivers returns appropriate to their risk, i.e. what theorists term a "martingale".
- Yesterday's trading decisions based on prices and returns are independent of today's state of play and tomorrow's investment opportunities.

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- If current share prices closely reflect current dividends and future profitability, agency theory can transform shareholder objectives into managerial policy.
- NPV maximisation represents the optimum managerial investment criterion to maximise shareholder wealth.
- New share issues that incorporate a market premium or discount should be based on their "intrinsic" value and ignore *market sentiment*.
- Creative corporate accounting will not fool the market.
- Takeover policies are also a *zero-sum game*, unless predatory corporate management can identify quantifiable synergistic benefits and economies of scale.

Summary and Conclusions

Irrespective of whether markets are efficient, behaviour is rational and prices or returns are random, every investor requires standards of comparison to justify their next trading decision. For example, has a firm's current price, dividend or earnings prospects risen, fallen, or remained the same, relative to the market, its competitors, or own performance over time? And how are they trending?

We have observed that the key to unlocking these questions presupposes an understanding of the nature of stock market efficiency. All the material contained in the *CVT* companion text builds on this and forms the basis of the remainder of this study.

So, let us conclude with a brief summary of the remainder of *CVT* for future reference before you read the following chapters.

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Part Two (Chapters Two to Four) evaluates conflicting theoretical share valuation models relative to profitable stock market investment, even if markets are perfect.

Chapter Two presents a sequence of theoretical share price valuation models. Each enables current shareholders, prospective investors and management to evaluate the risk-return profiles of their dividend and earnings expectations and the market capitalisation of equity.

But are dividends and earnings *equally* valued by investors who model share price?

Chapter Three deals explicitly with the *relevance* of the corporate dividend decision based on the pioneering work of Myron J. Gordon (1962). We analysed its impact on current share price, the market capitalisation of equity and shareholders' wealth, determined by the consequences of managerial policies to distribute or retain profits, which stem from their previous investment decisions and search for future investment opportunities.

Chapter Four then introduces an overarching theoretical and empirical critique of the *irrelevance* of dividend policy to the maximisation of shareholder wealth by Modigliani and Miller (MM) whereby:

Dividends and retentions are *perfect economic substitutes* and a firm's distribution policy cannot determine an optimum share price and hence share price maximisation.

Part Three translates conflicting *theories* of share valuation into *practical* terms with reference to *real world* share price listings, based on the *capitalisation of a perpetual annuity*.

Chapter Five explains how stock market data relating to price, dividends (the yield and cover) and earnings (the P/E ratio) are analysed by the investment community, supplemented by other informed sources to implement trading decisions (*i.e.* "buy, sell or hold").

Chapters Six and Seven evaluate various strategies for investment based on dividends, growth and whether we can "beat" the market.

Part Four then applies these market dynamics to corporate investment policies designed to maximise shareholder wealth.

Chapter Eight critically examines the specific case of a firm seeking a stock exchange listing and hence a market valuation for the first time.

Chapter Nine compares and contrasts rational shareholder objectives and various subjective, managerial motives for takeover activity.

Chapters Ten and Eleven analyse a series of comprehensive valuations for companies prey to takeover based on a rational consideration of long-run shareholder profitability compared with the irrational managerial motives of predator companies.

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Chapter Twelve concludes our analyses with a survey of the current takeover scene and a guide to investment behaviour based on a number of "golden" rules to investment explained throughout the text.

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Corporate Valuation and Takeover, (*CVT*), 2011.

Business Texts

Strategic Financial Management: Part I, 2010.
Strategic Financial Management: Part II, 2010.
Portfolio Theory and Investment Analysis, 2010.
The Capital Asset Pricing Model, 2010.

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Part II: Share Valuation Theories

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2 How to Value a Share

Introduction

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

Chapter Two of *CVT* set the scene, by outlining the determinants of *ex-div* share price using discounted techniques to define current price in a *variety* of ways. Each depends on a definition of future periodic income (either a dividend or earnings stream) under growth or non-growth conditions discounted at an appropriate cost of equity (either a dividend or earnings yield) also termed the equity capitalisation rate, within a time continuum.

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, we defined the *finite-period dividend valuation model.*

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, using the Equation numbering from the *CVT* text, which we shall adhere to wherever possible throughout the remainder of this study:

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

Likewise, given a forecast for periodic future earnings (E_t) and a desired return (K_e) based on current earnings yields of equivalent risk, we defined the *finite-period earnings valuation model* as follows:

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

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 earnings (E_t) plus its eventual *ex-div* sale price (P_n) using the current earnings yield (K_e) as a capitalisation rate.

We eventually focussed on a far simpler model using the *capitalisation of a perpetual annuity* favoured by stock exchanges worldwide, which enables the daily publication of price data, the current dividend yield and earnings yield, in the form of a price-earnings (P/E) ratio, by newspapers across the globe. This assumes that if shares are held indefinitely and the latest reported dividend or profit per share remains constant, current *ex div* price can be expressed using the *constant dividend valuation model* as follows:

$$(8) \qquad P_0 = D_1 / K_e$$

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' prospective rate of return (equity capitalisation rate) is also a constant represented by the current yield, which is assumed to be *maintainable* indefinitely.

$$(9) \qquad K_e = D_1 / P_0$$

Turning to published earnings data we observed that:

$$(10) \qquad P_0 = E_1 / K_e$$

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 prospective rate of return (equity capitalisation rate) is also a constant represented by the current earnings yield, which is assumed to be *maintainable* indefinitely.

$$(11) \qquad K_e = E_1 / P_0$$

Because a company's shares cannot sell for different prices at a particular point in time we then noted that:

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

If management pursue a policy of full distribution (whereby $D_1 = E_1$) then the current dividend and earnings yields must also be identical.

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

But if a company retains a proportion of earnings for reinvestment ($D_1 < E1$) the dividend yield will be lower than the earnings yield:

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

For example, if a company's, latest reported dividend and earnings per share are £1.00 and £1.60 respectively, trading at a current price of £8.00 then because earnings *cover* dividends 1.6 times, the dividend yield is only 62.5 per cent of the earnings yield (12.5 per cent and 20 percent respectively).

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

However, you will recall that to avoid any confusion between dividend and earnings yields when analysing a company's performance, published listings adopt a universal *convention*. The right-hand terms of the current earnings yield defined by Equation (11) are inverted to produce the return's *reciprocal*, namely a *valuation multiplier*: the price-earnings (P/E) ratio.

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

Exercise 2: The Dividend Yield, Cover and the P/E Ratio

Unlike the dividend yield and the earnings yield, which are *percentage* returns, 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. However, it does not stand alone when we analyse a company's performance. With information on dividend yield, or dividend cover it is possible to construct a comprehensive investment profile for the basis of analysis.

Consider the following data relating to four companies whose dividends are covered twice by earnings.

Company	A	B	C	D
Dividend Yield (%) = $D_1 / P_0 = K_e$	1.25	2.5	5	10

Required:

1. Tabulate the earnings yield and corresponding P/E ratio for each company.
2. Comment on the mathematical relationship between these two measures and its utility.

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An Indicative Outline Solution

1. The corresponding earnings yields and P/E ratios for each company can be tabulated as follows:

Company	A	B	C	D
Earnings Yield ((%) = $E_1 / P_0 = K_e$	2.5	5	10	20
$P/E = P_0 / E_1 = 1/K_e$	40	20	10	20

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

2. The Mathematical Relationship
   Because the two measures are reciprocals of one another, whose product always equals one, there is always a *perfect inverse* relationship between a share's earnings yield and its P/E ratio.

   The interpretation of the P/E is that the *lower* the figure, the *higher* the earnings yield and *vice versa*. 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, media, analyst reports, or internet downloads.

Summary and Conclusions

Not only is the previous exercise useful for future reference throughout this text once we begin to interpret the interrelationships between price, dividend yield and the P/E ratio in Part Three. But in the interim your regular reading of the financial press as a guide to further study outlined in Chapter One should also fall into place. However, before we analyse this practical methodology for analysing corporate, stock market performance, we need to consider its theoretical limitations with answers to the following questions.

What happens to current share prices listed in the financial press if the latest reported dividends, or earnings, are not constant in perpetuity?

For the purpose of equity valuation, are dividends (yields) more important than earnings (P/E ratios) or *vice versa* within the investment community?

To understand the debate, I suggest that you do some preparation by reading the remainder of *CVT* Part Two (Chapters' Three and Four) which evaluates the theoretical and real-world implications of dividend policy, rather than earnings, as a determinant of equity prices and shareholder wealth maximisation.

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3 The Role of Dividend Policy

Introduction

We began Part Two with an overview of share price valuation theory as a basis for stock market analysis using the dividend yield, dividend cover and the P/E ratio The following Exercises focus on the impact of managerial dividend and reinvestment policies on current share price, the market capitalisation of equity and shareholders' wealth, as a prelude to whether dividends (yields) and earnings (P/E ratios) are *equally* valued by investors.

Exercise 3.1:The Gordon Growth Model

Throughout the late 1950's, Myron J. Gordon (initially working with Ezra Shapiro) formalised the impact of distribution policies and their associated returns on current share price using the derivation of a *constant growth* formula, the mathematics for which are fully explained in the *CVT* text.

What is now termed the *Gordon dividend growth model* determines 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.

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Required:

1. Present a mathematical summary of the Gordon Growth Model under conditions of *certainty*.
2. Comment on its hypothetical implications for corporate management seeking to maximise shareholder wealth.

An Indicative Outline Solution

These questions not only provide an opportunity to test your understanding of the companion text, but also to practise your written skills and ability to editorialise source material.

1. The Gordon Model
   According to Gordon (1962) movements in *ex-div* share price (P_0) under conditions of *certainty* relate to the profitability of corporate investment and not dividend policy.

   Using Gordon's original notation and our Equation numbering from *CVT* (Chapter Three) 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) $P_0 = (1\text{-}b)E_1 / K_e - rb$ subject to the proviso that $K_e > r.b$ for share price to be *finite*.

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

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

2. The Implications
   In a world of *certainty*, Gordon's analysis of share price behaviour confirms the importance of Fisher's relationship between a company's return on reinvestment (r) and its shareholders' opportunity cost of capital rate (K_e).

Because investors can always borrow, or sell part of their holding to satisfy any income requirements, movements in share price relate to the profitability of corporate investment opportunities and not alterations in dividend policy. To summarise the dynamics of Equation (16):

1. Shareholder wealth (price) will stay the same if r is equal to Ke
2. Shareholder wealth (price) will increase if r is greater than Ke
3. Shareholder wealth (price) will decrease if r is lower than Ke

Exercise 3.2: Gordon's 'Bird in the Hand' Model

Moving into a world of uncertainty, Gordon (*op cit*) explains why rational-risk averse investors are no longer indifferent to managerial decisions to pay a dividend or reinvest earnings on their behalf, which therefore impacts on share price.

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Required:

1. Present a mathematical summary of the difference between the Gordon Growth Model under conditions of *certainty* and *uncertainty*.
2. Comment on its hypothetical implications for corporate management seeking to maximise shareholder wealth.

An Indicative Outline Solution

Again, these questions provide opportunities to test your understanding of the companion text and practise your written and editorial skills.

1. The Gordon Model and Uncertainty
   According to Gordon (*ibid*) movements in share price under conditions of *uncertainty* relate to dividend policy, rather than investment policy and the profitability of corporate investment. He begins with the basic mathematical growth model:

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

This again simplifies to:

(17) $P_0 = D_1 / K_e - g$ subject to the constraint that $K_e > g$

But now, the *overall* shareholder return (equity capitalisation rate) is no longer a *constant* but a function of the *timing* and *size* of the dividend payout. Moreover, an increase in the *retention ratio* also results in a further rise in the periodic capitalisation rate. Expressed mathematically:

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

2. The Implications
   According to Gordon's uncertainty hypothesis, rational, risk averse investors adopt a "bird in the hand" philosophy to compensate for the non-payment of future dividends.

   They *prefer dividends now, rather than later*, even if retentions are more profitable than distributions (i.e. $r > K_e$).

   They prefer *high dividends to low dividends* period by period. (i.e. $D_1 > D_{2 \dots}$).

   Near dividends and *higher* payouts are discounted at a lower rate (K_{et} now dated) ,

   Thus, investors require a higher overall *average* return on equity (K_e) from firms that retain a higher proportion of earnings with obvious implications for share price. It will fall.

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Gordon presents a plausible hypothesis in a *world of uncertainty*, where dividend policy, rather than investment policy, determines share price.

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 *ex-div* value of ordinary shares:
Share prices are:

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

To summarise Gordon's position:

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

Exercise 3.3: Growth Estimates and the Cut-Off Rate

The derivation of variables that comprise the Gordon model under conditions of certainty based on Equation (17) is not problematical. With *zero* growth, the model is equivalent to Equation (8), the *constant dividend valuation model* explained in Chapter Two, which simply discounts the next dividend (D_1) at a *constant* equity capitalisation rate (K_e) using the current yield.

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If growth is *positive*, Gordon determines 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 (g) the *constant* annual rate of growth in dividends. This growth rate (g = r.b)) is *equivalent* to the multiplication of a *constant* return (r) on new projects financed by a *constant* retention rate (b).

Subject to the mathematical proviso that Ke> g, it follows that if

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

Then shareholder wealth, measured by *ex-div* share price, stays the same, rises or falls, which confirms Fisher's Separation Theorem (1930) outlined at the beginning of our study.

So far so good, but if management finance future projects by retaining profits and shareholders wish to incorporate this data into their analysis of corporate performance in their quest for wealth, how do they calculate the growth rate?

In the real world, dividend-retention policies are rarely constant. Even if they are uniform, management and those to whom they are ultimately responsible still need annual growth estimators. A simple solution favoured by the investment community, even if the future is uncertain, is to assume that the past and future are *interdependent*. Without information to the contrary, Gordon (*op cit*) also believed that a company's anticipated growth could be determined from its financial history and incorporated into his model.

Consider the following data available from the published accounts for the Adele company.

Year	Dividend per Share ($)
2008	20.00
2009	22.00
2010	24.20
2011	26.62
2012	29.28

Required:

1. Using a mathematical growth formulae of your choice, calculate the company's *average* periodic growth rate, as a future *estimator* of g
2. Use your answer to derive the forecast dividend for 2013 and assuming the company's shares are currently trading at $268.40 *ex-div*, calculate the dividend yield, namely the equity capitalisation rate (managerial cut-off rate for new investment) according to the Gordon Growth model.

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An Indicative Outline Solution

1. The Annual Growth Rate
   Using the formula $(D_t - D_{t-1})/D_{t-1}$ or alternatively $(D_t - D_{t-1}) -1$, we can determine *annual* dividend growth rates.

Year	Annual Growth Rate
2008-9	(22.00/20.00) -1 = 0.1
2009-10	(24.20/22.00) -1 = 0.1
2010-11	(26.62/24.20) -1 = 0.1
2011-12	(29.28/26.62) -1 = 0.1
Total	0.4

The *average* periodic growth rate, as an *estimator* of g, is therefore given by the sum of annual growth rates divided by the number of observations.

g = 0.4 / 4 = **10%**

Alternatively, we can calculate dividend growth by solving for g in the following equation and rearranging terms.

$\$20\ (1+g)^4 = \$29.28.$

$(1 + g) = \sqrt[4]{(29.28/20.00)}$

g = 1.10 - 1.00 = 0.10 = **10%**

2. The Forecast Dividend and Yield
   Using the previous data and the appropriate equations:

The forecast dividend per share for 2013 should be

$\$29.28\ (1.1) =$ **$32.21**

If Adele's shares are currently priced at $268.40 and dividends are expected to grow at ten per cent per annum beyond 2013, the current yield is 22 per cent. This is derived by solving for K_e in the Gordon Growth model as follows:

(17) $P_0 = D_1 / K_e - g = \$32.21 / K_e - 0.10 = \$268.40$

Rearranging terms:

$K_e = (D_1 / P_0) + g = (\$32.21 / \$268.40) + 0.10 =$ **22%**

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Summary and Conclusions

Our Exercises have focused on the inter-relationships between dividend policy, the behaviour of the dividend yield and the price of a company's shares in the presence of growth financed by retentions. They illustrate why Myron J. Gordon believed that movements in share price relate to:

1. Corporate investment policy, rather than dividend policy under conditions of certainty.
2. Dividend policy, rather than corporate investment policy, under conditions of uncertainty.

According to his "bird in the hand" hypothesis, the policy objective for an all-equity firm in a real world of uncertainty is *unambiguous*:

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

But as we explained in *CVT*, when Gordon published empirical evidence designed to test his hypothesis and theoretical conclusions, his results were *inconclusive*. The reasons for which, we shall now analyse in Chapter Four

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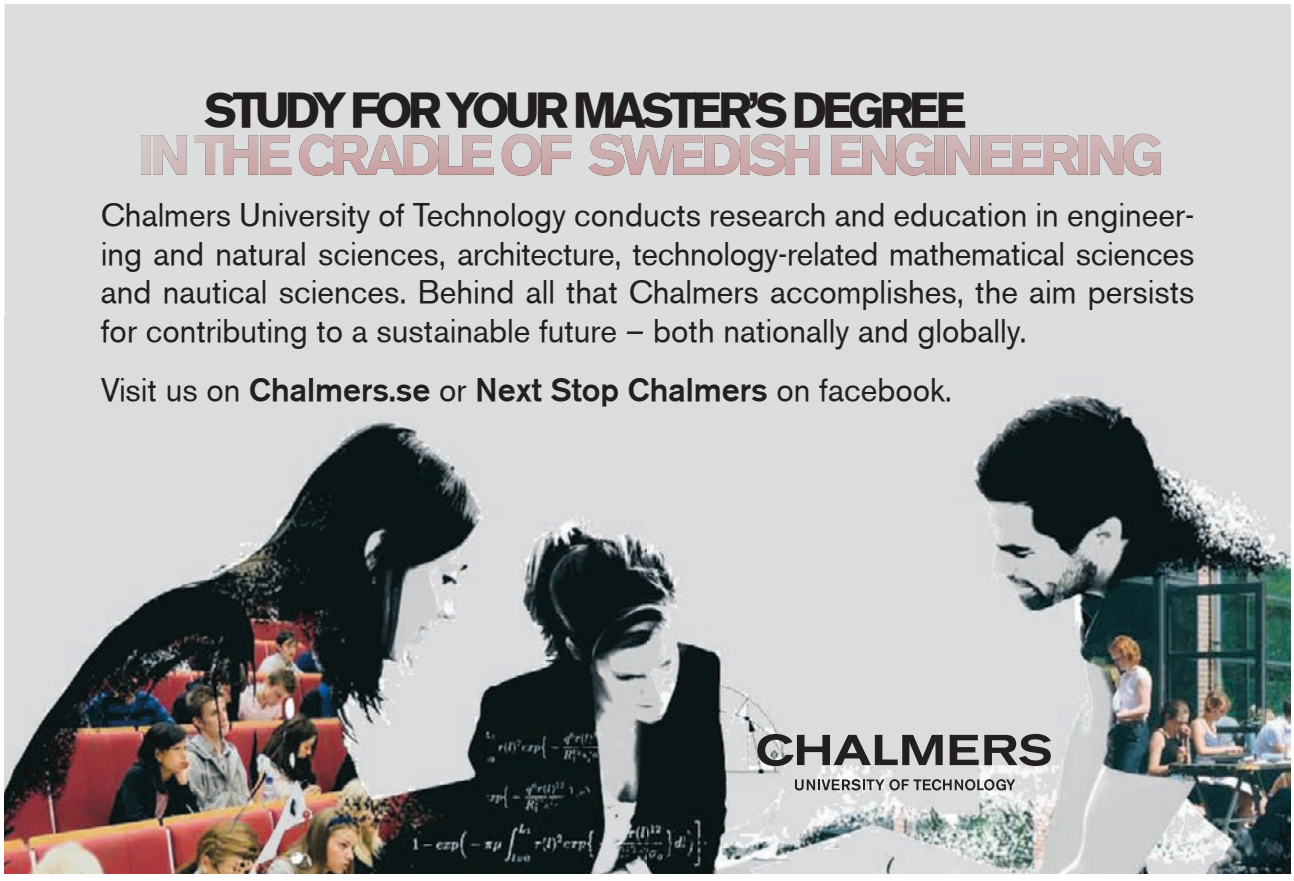

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4 Dividend Irrelevancy

Introduction

In a world of *uncertainty*, but reasonably efficient markets, Gordon presents a plausible hypothesis to explain why movements in share price relate to corporate dividend policy using the following growth model.

(17) $P_0 = D_1 / K_e - g$ subject to the constraint that $K_e > g$

Because rational, risk-averse investors prefer their returns in the form of dividends now, rather than later (a "bird in the hand" philosophy), the *overall* shareholder return (yield) or managerial cut-off rate for investment, is not a *constant* but a function of the *timing* and *size* of the dividend payout ratio. Expressed mathematically:

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

Consequently, share price is a *positive* function of the dividend payout ratio.

As we explained in Chapter Three, Gordon and others who tested his model empirically were unable to prove this proposition categorically, even for all-equity firms, because of the statistical problem of *multicolinearity*. Explained simply, change D_1 and all the other variables on the right hand side of Equation (17) are also affected (i.e. not only K_e but g).

Fortunately, two of Gordon's American academic contemporaries, Franco Modigliani and Merton H. Miller (MM henceforth) provided the investment community with a lifeline.

According to MM (1961 onwards) the equity capitalisation rate (K_e) conforms to the company's class of business risk, so that under conditions of *certainty* share price is indeed a function of corporate investment and not dividends, just as Gordon predicts.

However, under conditions of *uncertainty*, MM maintain that the statistical significance of the Gordon model is *inconclusive* because it confuses dividend policy with investment policy.

- Any increase in the dividend payout ratio, without any additional finance, reduces a firm's operating capability and *vice versa*.
- 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:

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

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where K_e equals the shareholders' desired rate of return (yield) and managerial cut-off rate for investment, which correspond 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*.

MM then proceed to prove that because dividends and earnings are *perfect economic substitutes* in reasonably efficient markets:

> For a *given* investment policy of *equivalent* business risk, a change in dividend (D_1) cannot alter a company's current ex-div share price (P_0) because K_e remains constant.
>
> The next ex-div price (P_1) increases by any corresponding reduction in dividend (D_1) and *vice versa*, leaving P_0 unchanged

Exercise 4.1: Dividend Irrelevancy

Before we rehearse the MM *dividend irrelevancy hypothesis* more fully, let us benchmark the inter-relationship between shareholder wealth maximisation, the supremacy of investment policy and dividend irrelevancy in a perfect capital market characterised by Fisher (*op cit*).

Suppose the Winehouse Company, an all equity firm generates a net annual cash flow of £100 million to be paid out as dividends in perpetuity. The yield and corporate cut-off (discount rate) correspond to a 10 per cent market rate of interest commensurate with the degree of business risk. Thus, the *constant dividend valuation model*, based on the capitalisation of a *level perpetuity* gives a total equity value (market capitalisation):

$$V_E = £100 \text{ million} / 0.10 = £1{,}000 \text{ million}$$

Now assume that the company intends to finance a new project of equivalent risk by retaining the next dividend to generate an *incremental* net cash inflow of £200 million twelve months later, all paid out as an *additional* dividend. Thereafter, a full distribution policy will still be adhered to.

Required:

1. Calculate the revised value for V_E
2. Evaluate whether management is correct to retain earnings and whether shareholders should continue to invest in the company?

An Indicative Outline Solution

Our answer reviews the investment and financial criteria that underpin the normative objective of shareholder wealth maximisation, using NPV maximisation as a determinant of share price.

1. The Revised Equity Value (V_E)
   The first question we must ask ourselves is how the incremental investment (a new project financed by the non-payment of a dividend) affects the shareholders' wealth?

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We can present the managerial retention decision in terms of the revised dividend stream:

	t_0	t_1	t_2	t_3	....	t_∞
£ million	£	£	£	£		£
Existing dividends		100	100	100		100
Project cashflows		(100)	200	-		
Revised dividends		-	300	100		100

If we now compare total equity values using the *discounted value* of future dividends:

V_E (existing) = £100 million / 0.10 = **£1,000 million**

V_E (revised) = £300 million / $(1.1)^2$ + (£100 million / 0.10) / $(1.1)^2$ = **£1,074.4 million**

Thus, once the project is accepted the present value (PV) of the firm's equity capital will rise and the shareholders will be £74.4million better off.

For those of you familiar with DCF analysis and the NPV concept, it is also worth noting that the same wealth maximisation decision can be determined from a *managerial perspective* without even considering the fact that the pattern of dividends has changed.

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The increase in total value is simply the new project's *net present value* (NPV) given by the corporate DCF capital budgeting model.

$$\text{NPV} = \frac{(£100\text{million})}{1.1} + \frac{£200\text{ million}}{(1.1)^2} = \textbf{£74.4 million}$$

2. An Evaluation of the Data
   In our example, management is correct to retain earnings for reinvestment. The shareholders relinquish their next dividend. However, they gain an increase in the current *ex-div* value of their ordinary shares, which not only conforms to Fisher's Separation Theorem but also the MM dividend irrelevancy hypothesis.

In perfect capital markets, where the firm's investment decisions can be made independently of the consumption decisions of shareholders: - NPV project maximisation produces shareholder wealth maximising behaviour. - It is a change in investment and *not* dividend policy that determines the value of equity.

Exercise 4.2: The MM Dividend Irrelevancy Hypothesis

Chapter Four of *CVT* presents a comprehensive theoretical exposition and practical illustrations of the MM dividend irrelevancy hypothesis from both a *proprietary* (shareholder) and *entity* (managerial) perspective. Based on a sequential case study of different dividend-retention policies, initially applied to Gordon's growth model in Chapter Three, we developed a data set for an all equity firm (Jovi plc) with one million ordinary shares (common stock) in issue and an individual investor holding 40,000 shares. We observed that if Jovi adopts a *nil* dividend distribution policy, its current *ex-div* price per share was defined as follows using the MM *one period* model:

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

Required:

If you return to the companion text (*CVT*) and the Review Activity for Chapter Four, you will find the following question, for which I did not provide an answer.

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?

Let us now work through this together, given the assumption that profits are reinvested in projects of similar business risk with an equivalent yield of 2.5 per cent:

An Indicative Outline Solution

Our answer to the *CVT* Review Activity reinforces why MM hypothesised that dividends and retentions may be *perfect substitutes* in an all-equity firm, leaving shareholder wealth unaffected by changes in dividend distribution policy.

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1. Dividend Irrelevancy
   For a given investment policy of equivalent risk, a change in dividend policy (either way) does not alter current share price. The future *ex-div* price falls by the rise in the dividend for a given investment policy of equivalent business risk and *vice versa*, leaving the current *ex-div* price unchanged.

2. The Shareholders' Reaction
   The MM case for *dividend neutrality* suggests that if a firm reduces its dividend payout, then shareholders can always satisfy their current income (consumption) preferences by creating *home-made* dividends. As we observed in Chapter Four, either they sell a requisite proportion of their holdings at an enhanced *ex-div* price, or borrow at the prevailing market rate of interest.

In our question, the company has moved from a *zero* distribution to a partial distribution. So, do shareholders who stay with the firm have a problem?

Using Equation (18) and our data where the Jovi company retains all earnings and K_e = 2.5%.

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

Assuming that the firm pursues a 50 per cent retention policy to reinvest in projects of equivalent business risk (i.e. K_e = 2.5 per cent).

MM would redefine:

$P_0 = D_1 + P_1 / 1 + K_e$ = £0.05 + £4.05 / 1.025 = £4.00

So, no shareholder is worse off.

3. The Company's Reaction
   For their part too, firms can resort to new equity issues in order to finance any shortfall in their investment plans, or if they wish to pay a dividend.

Reconsider Jovi with an original nil distribution and dedicated investment policy, whose shares are currently valued at £4.00 with an *ex-div* price of £4.10 at time period one:

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

The company has now decided to distribute 50 per cent of its earnings as dividends (5 pence per share on one million shares currently in issue).

If investment projects are still to be implemented, the company must raise new equity equivalent to the proportion of investment that is no longer funded by retained earnings. From our equations for the MM proof in Chapter Four, this equals:

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(20) $mP_1 = nD_1 = £50{,}000$

The substitution of this figure into the equation for the total market value of the original shares, based on all the shares outstanding at time period one (nP_1+mP_1), defines 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 the term ($mP_{1 =} nD_1$) disappears from this equation, it simplifies to:

(22) $nP_0 = 1/ K_e (n + m) P_1 = 1/ 1.025 (nP_1 + £50{,}000) = £4$ million

Since P_1 is the only *unknown*, dividing through by the number of Jovi's shares originally in issue (n = one million) and using Equation (18)

$P_0 = D_1 + P_1 / 1 + K_e = £0.05 + P_1 / 1.025 = £4.00$

And solving for P_1:

$P_1 = £4.05$

So, as MM hypothesise:

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Share price movements compensate for revisions to dividend-retention policy.

In our example, the *ex-div* share price at the end of the period has fallen from its initial value of £4.10 to £4.05, which is exactly the same as the 5 pence rise in dividend per share, leaving P_0 unchanged.

Because the dividend term disappears from the MM equation for the market capitalisation of equity, it is impossible to assert that share price is a function of dividend policy.

Summary and Conclusions

Once a company has issued ordinary shares (common stock) and received the proceeds, it is neither directly involved with their subsequent market transactions, nor the prices at which they are transacted. These are negotiable between existing shareholders and prospective investors, based on their perception of corporate performance measured by earnings, dividends, growth and capital gains. So, in mature mixed market economies where ownership is divorced from control, modern finance theory neatly resolves this dilemma by assuming (rightly or wrongly) that:

The normative objective of modern financial management is to maximise shareholder wealth, based on NPV maximisation techniques.

We therefore began our analysis of this objective by tracing the development of modern finance throughout the twentieth century, underpinned by the simplistic assumptions of reasonably efficient capital markets under conditions of *certainty* with few barriers to trade, characterised by freedom of information.

According to a significant body of independent academic work by Fisher (1930), MM (1961) and Gordon (1962), reinforced by the efficient market hypothesis (EMH) of Fama (1965) and agency theory formalised by Jensen and Meckling (1976)

Management can justify retained earnings to finance future investment, rather than pay a current dividend, if their marginal return on new projects at least equals the market rate of interest that shareholders could obtain by using dividends to finance alternative investments of equivalent business risk elsewhere.

Shareholders would support such behaviour, since it cannot detract from their wealth. What they lose through dividends foregone, they receive through increased equity values generated by internally financed projects discounted at their required opportunity rate of return.

Moving to a real world of *uncertainty*, however, this academic consensus falls apart.

Gordon believes that movements in share price relate to corporate dividend policy, rather than investment policy. Rational, risk-averse investors should prefer their returns in the form of dividends now, rather than later. So, share price is a *positive* function of the dividend payout ratio.

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MM maintain that because dividends and retentions are *perfect economic substitutes*, shareholders who need to replace a missing dividend to satisfy their consumption preferences have a simple solution. They can create *home-made* dividends by either borrowing an equivalent amount at the same rate as the company, or sell shares at a price that reflects their earnings and reap the capital gain.

According to MM, the borrowing (discount) rate is defined by an investment's *business* risk (the variability of earnings) and not *financial* risk (the pattern of dividends). So, corporate distribution policy is trivial. Dividend decisions are concerned with what is done with earnings after the event, but do not determine the risk originally associated with the quality of investment that produces them.

Let us now translate these conflicting theories into twenty-first century practice.

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Part III: A Guide to Stock Market Investment

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5 Stock Market Dynamics: An Illustration

Introduction

Part Three of the *CVT* companion text translates conflicting *theories* of share valuation into *practical* terms with reference to *real world* share price listings, based on the *capitalisation of a perpetual annuity*.

Chapter Five explains how published stock market data relating to price, dividends (the yield and cover) and earnings (the P/E ratio) are analysed by the investment community, supplemented by other informed sources to implement trading decisions (whether buy, sell or hold).

Chapters Six and Seven evaluate various strategies for investment based on dividends, growth and whether we can "beat" the market.

Assuming that you are already familiar with this material:

The purpose of this Chapter is to illustrate how the distillation of company data into a few select metrics can provide the private investor with a disciplined framework for analysing the dynamics of its stock market performance

Exercise 5.1: Published Accounting and Stock Market Data

Consider the following financial data for Ozzy plc.

Share Capital: Par or Nominal Value (£1.00)	£ 100 million
Profit after Tax	£ 10 million
Dividend Percentage	5 %
Market Capitalisation of Equity	£ 200 million

Required:

Reformulate the data to provide *accounting* (cost) and *market* (value) investment profiles as a basis for analysing the company's performance and comment on their utility.

An Indicative Outline Solution

The *accounting* profile for Ozzy plc comprises:

Par Value: £1.00; Dividend per share (DPS):5p; Dividend %:5%; Earnings per share (EPS):10p: ROCE 10%

Because this data is *cost* based it reveals absolutely nothing about the "true" performance of the company, even if we have similar figures for previous years, or data for similar firms in a similar industry,

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In contrast, a *value* investment profile, based on the market capitalisation of equity, takes us beyond the "regulatory" (GAAP) framework of accounting and out into the "real world" of financial analysis.

The *market* profile for Ozzy (as published in the financial press) can be derived from a reformulation of the accounting data derived from DPS (5 pence) EPS (10 pence) and the *market price per share* of £2.00 (rather than £1.00 par or nominal value).

Price: £2.00; Dividend Yield: 2.5%; Cover: 2.0; P/E: 20; Earnings Yield; 5%

- The Dividend yield is the *percentage* dividend received for every £100 invested in a company.
- The Dividend cover gauges the *quality* of dividends (i.e. their risk of being cut) in relation to earnings
- The P/E ratio is the *reciprocal* of the earnings yield for every £100 invested.

Admittedly, this listing also reveals little about the company in isolation. Remember that performance is *relative* and *dynamic*. So, it must be placed in context using comparisons, such as movements in the market, similar firms in similar industries, or the firm itself over time.

However, armed with benchmark data for Ozzy plc and these comparisons (which are freely available) a *value* rather than *cost* based analysis should reflect current economic reality more accurately.

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Exercise 5.2: "Beating" the Market

To analyse the dynamics of stock market performance, assume that Ozzy plc is a *blue chip* company with a reasonable investment profile in a sound market sector, all of which you have gleaned from the financial press, analyst reports, media comment and the internet.

You will recall that the company's latest *investment* profile, published by the financial press in their stock exchange listings comprises:

Price: £2.00; Dividend Yield: 2.5%; Cover: 2.0; P/E: 20; Earnings Yield; 5%

So, would you include this company in a *diversified* portfolio of investments?

Without *comparative* price, yield, cover and P/E data relative to the market or competitors over time, there is no definitive answer. Like all companies, Ozzy plc must be placed in context. But on the available qualitative information, it is reasonable to assume that rational, risk-averse investors would hold a proportion of the company's shares in their portfolio.

Required:

Assume you therefore own a proportion of Ozzy's shares and over lunch with a board member she reveals that the company is about to issue a *profit warning*. Having recently attended a government conference on the Eurozone crisis, she also believes that the economy will suffer a 50 per cent downturn in the near future.

Armed with this information

1. What is your next move?
2. How will markets react when your "insider" information enters the public domain?
3. What are the eventual implications for the company's stock exchange listing when recession bites?
4. Did you "beat" the market?

As a guide to your answers, incorporate a hypothetical sequence of stock market indicators, beginning with Ozzy's current *investment* profile, as the company and the economy take a turn for the worse.

An Indicative Outline Solution

Whilst stock market analysis is not an exact science, the traditional view based on the EMH asserts that:

Without access to "insider" information (which is illegal) in the long run it is impossible to beat the market (except by accident and not design) because investors are *rationa*l, markets are reasonably *efficient* and therefore movements in price and returns are *random*.

But you are in a "privileged" position with access to information that has not yet entered the public domain.

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1. What is your next move?
   The future profits and prices for Ozzy plc will fall as the economy moves into recession. If you accept the illegality of your actions, your *rational* response should be to sell immediately and reap a capital gain, whilst the rest of the market is oblivious to future events.

2. How will markets react when *all this information* enters the public domain?
   If the stock market is reasonably efficient, Ozzy's price should fall, simply because something must give; either distributions or retentions used to finance re-investment. Otherwise, the company must increase its borrowing to maintain the balance between the two

And this is where more information and figures would be useful.

Let us assume that with the profit warning and a 50 per cent economic down turn, the company's share price *tracks* the market's recession. EPS also halves, falling from 10 pence to 5 pence. However, management decide to maintain a dividend of 5 pence per share.

Can you now fill in the gaps in the following investment profile post-recession denoted by a question mark?

Pre- Recession:	Price: £2.00;	Yield: 2.5%;	Cover: 2.0;	P/E: 20;	Market Capitalisation: £20 million.
Post-Recession:	Price: £1.00;	Yield: ? ;	Cover: ? ;	P/E: ? ;	Market Capitalisation: ?

If so, you will note that:

- The dividend yield has doubled to 5 per cent and the dividend cover has halved to one.
- The P/E ratio remains unchanged at 20, which is equivalent to the original earnings yield of 5 per cent.
- The market capitalisation of equity has halved to £10 million.

The market's *dynamics* can be explained as follows

- Although the 5 pence dividend per share is maintained, the "quality" of the dividend (financial risk) measured by the cover deteriorates because EPS has halved from 10 to 5 pence.
- Shareholders receive twice the previous dividend yield but not because the investment is more profitable.
- New investors will now pay only half the price (£1.00) for the same distribution (5 pence) to compensate for twice the financial risk (*i.e.* the rising yield reflects the increased likelihood of the non-payment of a dividend).

3. What are the eventual implications for the company's stock exchange listing?
   As we observed in *CVT*:

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

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However, a piece of this puzzle still doesn't fit. Why do the company's earnings yield and corresponding P/E ratio remain the same, once the recession sets in?

You will recall from our previous discussion of the MM *dividend irrelevancy* hypothesis that yields based on the quality of earnings only remain *constant* for a *given* investment policy of *equivalent* risk that *will not change*

But in our scenario, the company's future re-investment policies and earnings potential have been cut back by management's desire to maintain dividend distributions, despite a profit warning and economic recession. So, shouldn't the earnings yield also rise (and the P/E ratio fall) to compensate for *business* risk?

To illustrate how the market might react according to MM, let us assume that rational, risk-averse investors therefore continue to sell their shares and its price falls further to 75 pence. This is reasonable, given another fundamental rule of stock market law explained in *CVT*.

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

After the recession we therefore observe the following revised *equilibrium* share price listing for Ozzy plc:

Price: £0.75; Yield: 6.66%; Cover: 1.0; P/E: 15; Market Capitalisation: £75 million.

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4. Did you "beat" the market?
   Based on *insider information*, of course you did!

Selling "high" at £2.00 produced a profit of £1.25 per unit on your shareholding, which now trades at only 75 pence.

Summary and Conclusions

In Chapter One of this Exercise series and our *CVT* theoretical companion text, we have emphasised that irrespective of whether markets are efficient, behaviour is rational and prices or returns are random, every investor requires standards of comparison to justify their next trading decision. For example, has a firm's current price, dividend or earnings prospects risen, fallen, or remained the same, relative to the market, its competitors, or own performance over time? And how are they trending?

Subsequently, we have observed that the key to unlocking these questions presupposes a theoretical understanding of how shares are valued and its application by investors (institutional or otherwise) using information that may, or may not, lie in the public domain.

We have also noted that without access to insider information, stock market analysis is not an exact science. You are one of a multiplicity of *ordinary* market participants, rather than a member of the *privileged* few. You "win some" you "lose some" because overall investment is a "fair" game for all. However, this is where individual attitudes to risk come into play and the "science" breaks down.

You will recall from Part Three of *CVT* that another "golden" rule for profitable investment is to sell shares when their price is high and buy when low. So looking back to Exercise 5.2 and the final *equilibrium* profile for Ozzy plc you obviously have a "golden" opportunity to reinvest the profit from insider trading of the company's shares before the market bottoms out and *speculative* investors, or *predatory* companies motivated by takeover, express an interest that could force price up.

Notice, however, that Ozzy plc might seem a bargain buy but only because the company is currently worth more "dead than alive". Private investors should therefore be cautious.

Explained simply, the new market capitalisation of equity (£75 million) is not only less than its market valuation (£20 million) prior to the profit warning and recession, but also the original issue price of £100 million based on its nominal (par) value of £1.00 per share revealed by the Balance Sheet. So, there is certainly no evidence of "goodwill" and the tangible assets (even at historical cost) are likely to be worth more than 75 pence per share. All of which means that the company is ripe for take over, not as a *going concern* but for "asset stripping".

To prove the point, consider the original data set for Ozzy plc presented in Exercise 5.1 before any public or private knowledge of a profit warning or economic recession.

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Share Capital: Authorised and Issued (£1.00)	£100 million
Profit after Tax	£10 million
Dividend Percentage	5%
Market Capitalisation of Equity	£200 million

And as a prelude to the Exercises in Part Five that deal with takeover activity, it would be useful to amend this table for future reference using the post-recession data.

Selected References

1. Hill, R.A., *Corporate Valuation and Takeover:* Parts One, Two and Three, bookboon.com (2011).
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.

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Part IV: Valuation and Takeover

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6 A Stock Exchange Listing

Introduction

In Part Three we explained how share price listings based on valuation theories that encompass dividends (the yield and cover) and earnings (the P/E ratio) are analysed by private investors and financial institutions to implement their trading decisions (*i.e.*" buy, sell or hold").

We shall now apply these dynamics to the corporate sector and the specific case of a firm seeking a stock exchange listing and hence a market valuation for the first time. In Chapter Seven we shall develop this corporate theme with an analysis of the most important trading decision subsequently undertaken by corporate management: namely *the takeover of one firm by another*.

Exercise 6: Coming to the Market

At Board meetings of the privately owned Bowie Company, the recurrent question is how to finance future growth. The rational solution would appear to go public with a listing on the London Stock Exchange. Mr. David, the company chairman, produces the following information recently obtained from a Manhattan consultancy concerning two listed companies, Eno plc and Ronson plc. Both firms are similar to Bowie in respect to size, asset composition, financial structure and product mix.

		Eno ($)	Ronson ($)
2012	Earnings per share	1.50	2.50
2008 -12	Average earnings per share	1.00	2.00
2008 -12	Average market price per share	9.00	20.00
2012	Dividends per share	0.75	1.25
2008 -12	Average dividends per share	0.60	1.20
2012	Book value of assets per share	9.00	18.00

On the basis of this information, Mr. David asks what you think the Bowie Company was worth in 2012. The only other data that you have available at the moment are the company's final accounts, which disclose the following ($ million)

Share capital	100	$1.00 Ordinary shares
Post-tax earnings	400	
Gross dividend	100	
Book value of assets	3,500	

From memory, you also recall that the post-tax earnings and dividends for 2012 were one third higher than the average for the previous four years.

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Required:

As a basis for more detailed analysis;

1. Calculate *valuation multipliers* for Bowie based on those for Eno and Ronson.
2. Produce a range of values for Bowie using these multipliers.
3. Evaluate your results and advise the Chairman on the feasibility of going public.

An Indicative Outline Solution

The key to answering these questions is an understanding of the term *valuation multiplier*, which should be familiar, given our detailed discussion of the P/E ratio elsewhere in this text and its CVT companion. Using the concept of the capitalisation of a perpetual annuity (maintainable yield):

Value (price) is simply a *multiple* of earnings that may be interpreted as the number of years required to recoup your investment. Likewise, value can also be defined as a multiple of dividends, the price-dividend (P/D) ratio.

1. The Valuation Multipliers

   The competitors' P/E and P/D ratios (past, present or future) provide multipliers that can be applied to a company's earnings and dividends per share to determine a possible range of share prices if it is to go public. With the information available we can also use an *asset valuation ratio* (market value of assets over book value) to determine a *benchmark* price. Our over-arching objective is the derivation of a share price that ensures the successful launch of Bowie on the market as a going-concern. This two stage process can be summarised as follows:

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Earnings and dividends per share for Bowie ($million)

2012	EPS	= 400 / 100	= 4.00
2008 -12	Av EPS	= 320 / 100	= 3.20
2012	Div PS	= 100 / 100	= 1.00
2008 -12	Av DPS	= 80 / 100	= 0.80

This data has been derived as follows;

$ million		Earnings	Dividends
2012		400	100
2008 -11	Annual Averages	300	75
2008 -12	Total	1,600	400
2008 -12	Overall Average	320	80

Valuation Multipliers

Basis	Eno	Ronson
EPS	9.00 / 1.50 = 6	20.00 / 2.50 = 8
Av EPS	9.00 / 1.00 = 9	20.00 / 2.00 = 10
DPS	9.00 / 0.75 = 12	20.00 / 1.25 = 16
Av DPS	9.00 / 0.60 = 15	20.00 / 1.20 = 16.7
Market Price / Book Value	9.00 / 9.00 = 1.0	20.00 /18.00 = 1.1

2. A Range of Share Prices for Bowie: based on multiples for Eno and Ronson ($)

Earnings per share	24.00	32.00
Average Earnings per share	28.80	32.00
Dividends per share	12.00	16.00
Average Dividends per share	12.00	13.36
Market Price/Book Value	35.00	38.50

Note the calculation of Market Price/Book Value:

35 x 1.0	35 x 1.1

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3. A Data Evaluation
   Any discussion of your results should initially highlight the following points:

- Price per share varies widely from $12.00 to $38.50.
- The lower price range reflects *trailing* low dividend payout ratios.
- Prices still vary from $24.00 to $38.50, if we ignore dividend policy.
- Using the earnings multipliers (P/E ratios), price ranges narrow from $24.00 to $32.00 with an average of $28.00 for 2012.
- The highest price of $38.50 is defined by an *asset valuation ratio* (market value of assets over book value).

Bowie therefore has two problems that must be resolved before coming to the market.

Can you explain them?

Summary and Conclusions

To determine a realistic issue price, management must translate a company's financial history and current status disclosed by published accounts into a desirable *investment* profile, based on stock exchange listings for similar firms already quoted on the market. As a basis for valuation, this profile should encompass the dividend yield, the P/E ratio (or its reciprocal, the earnings yield) and latest asset position. These are factors upon which the company will be judged by prospective investors to ensure full subscription when it comes to the market.

In our illustration, the company has two dilemmas.

First, the lower range of valuations for Bowie reflects a history of low dividend payout ratios, which could deter prospective investors. After all, a share's price is ultimately determined by the discounted sum of expected future dividends. And adequate dividend yields are necessary to attract investors, now as well as in the future, who seek regular income.

On the other hand, it can be argued that the dividend valuations currently prepared for Bowie are obviously low because they are based on the *capitalisation of a perpetual annuity*, which is *constant*. It ignores any allowance for *growth* and the possibility of capital gains incorporated into future share prices when the stock is eventually sold. The provision of further data using the Gordon growth model explained in Chapter Three can remedy this situation. But it is worth noting that a low dividend payout ratio should not necessarily worry the company. The market may interpret a low yield relative to earnings as a *signal* by Bowie that it has a profitable re-investment strategy.

You will recall from *CVT* that many companies offer high prospective dividend yields because they have no growth prospects and little idea of what to do with any cash surplus. Indeed, we have already observed theoretically, why Modigliani and Miller (MM) way back in the 1960s maintained that the purpose of a dividend is to return unused funds to shareholders. This is not to say that companies should ignore distribution policy altogether. But eventually, a company is more likely to fail if dividends are excessive, leaving too little earnings for investment.

However, this leads to our second point.

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If companies seeking a stock exchange listing regard earnings as their *primary* valuation driver (which incorporates shareholders' future dividend and growth expectations to match those of its competitors) surely an earnings valuation should also exceed an asset valuation?

Without further information on the prospect of higher forecast levels of earnings for Bowie, the asset valuation multipliers, based on the relationship between market value and book value, produce the *highest* prices per share. But surely if the company is to expand and finance future growth, an earnings valuation should exceed an asset valuation, with the difference represented by what accountants' term "goodwill".

Unless there is something special about the firm's asset mix (such as a high proportion of recently valued property or investments) data drawn from its accounts is the least reliable measure of corporate worth, given the deficiencies of financial reporting based on GAAP analysis.

To conclude, the question that the company's chairman (Mr David) should address is not whether Bowie should seek a stock exchange listing, but whether it is worth more "dead than alive"?

Selected References

1. Hill, R.A., *Corporate Valuation and Takeover*, bookboon.com (2011).
2. Gordon, M. J., *The Investment, Financing and Valuation of a Corporation,* Irwin, 1962.
3. 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.

Som medarbetare i Riksbyggen vill vi att du ska känna att du är viktig och att du tydligt kan se hur du bidrar till att vi uppnår våra mål. Vi erbjuder dig stimulerande och utvecklande arbetsuppgifter i ett kreativt arbetsklimat.

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7 Acquisition Pricing Policy

Introduction

In Part Three we explained how private investors and financial institutions analyse share price listings based on valuation theories that encompass dividends (the yield and cover) and earnings (the P/E ratio) to implement their trading decisions (*i.e.*" buy, sell or hold").

Part Four began by applying these dynamics to the corporate sector and the specific case of a firm seeking a stock exchange listing and market valuation. We shall now analyse the most important trading decision undertaken by a listed company: namely *the takeover of one firm by another*.

Based on your reading of Chapters' Ten to Twelve of *CVT* and its referenced research, the objectives of our final Exercises are to:

- Illustrate why the commercial rationale for takeover activity should be based on wealth maximisation criteria, measured by a significant improvement in long-term earnings after an acquisition.
- Derive a *going-concern valuation* for one company (the "target") by another (the "predator") as a basis for acquisition.
- Demonstrate why the target company's going-concern capitalisation of future earnings (and bid price per share) prepared by the predatory company should exceed a corresponding current valuation of the target's net assets (which in turn should exceed its Balance Sheet figures).
- Explain why the difference between the two valuations and the price paid for "goodwill" should not be so highly valued (risky) as to invalidate the takeover.

Exercise 7.1: A "Suspect" Takeover Valuation

W. Stripes plc has completed an *objective* analysis of its strategic capabilities and decided upon a potential acquisition as the most viable means of achieving its goal, namely diversification. The chosen "target" is a "blue chip" company, Ozzy plc, whose background data you are already familiar with from Chapter Five. This company currently earns a "normal" return for its sector, although its current share price has been adversely affected by a recent "profit warning" and the wider economic recession.

For simplicity, we shall assume that Stripes' motivation for the takeover is not only rational but also *cash* based. So, borrowing *(leverage*) is not an issue.

The acquisition investment profile prepared by Stripes is summarised as follows:

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Target Data (pre-acquisition):		Predatory Data (post-acquisition):	
Nominal Share Capital (£1.00)	£100m	Net Asset Revaluation	£200m
Profit after Tax	£5m	Return on Assets	10 %
Market Capitalisation of Equity	£75m	Assimilation of Goodwill	5 years

The pre-acquisition data conforms to the table you were asked to derive at the end of Chapter Five for future reference.

Required:

Having read Part Four of the *CVT* text, prepare a financial report for Stripes that contains:

1. A summary of the *objective* and *subjective* motivational factors that underpin takeover activity.
2. A range of bid prices per share for Ozzy plc as a *going concern*, with reference to a:
- Net asset valuation
- Goodwill valuation
- Profitability valuation
3. A brief commentary on your findings
4. A risk assessment based on your valuations
5. Any recommendations

An Indicative Outline Solution

1. Motivational Factors
   An *objective* analysis of any prospective acquisition should be based on *rational* managerial objectives underpinned by shareholder wealth maximisation criteria. Hopefully, these will be confirmed subsequently, by a significant improvement in the predator company's long-term earnings post-acquisition. Chapter Nine of *CVT* explains how this requires a comprehensive valuation based on the following strategic considerations prior to take-over activity.

Business Resource Influence

However, all too often, the *agency principle* breaks down because *subjective* managerial motives associated with an acquisition take precedence over commercial objectives, notably management's pursuit of:

Growth Prestige Security

And as we observed in *CVT* (Chapter Nine) the history of corporate takeovers revealed by the academic literature illustrates the extent to which these policies lead to financial disaster.

With regard to Stripes strategy, diversification can vary its activities. It is always sensible to avoid "putting all your eggs in one basket". But will this add value and create shareholder wealth?

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If you have read the bookboon text "Portfolio Theory and Financial Analyses" (2010) or any others by the author on the subject (see the references at the end of this Chapter) you will be aware that diversification can help management in one of two ways.

Academic studies reveal that diversification has the potential to provide:

- The same return on investment as before, but with less risk.
- Higher returns than before, for the same risk.

Unfortunately, diversification isn't simply a question of investors buying more shares to add to their portfolio, or of one company acquiring another. "Efficient" diversification arises from researching individual shares, or companies, with different returns from different business activities that perform well at different points in the economic cycle.

The key to profitable risk- return diversification requires genuinely different sources of income. Hopefully, Stripes has researched this?

2. A Bid Price per Share
   An offer for Ozzy's shares, currently trading at 75 pence (25 pence below nominal value because of a profit warning and recession), depends on three factors researched by Stripes:

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- The minimum purchase price of net tangible assets,
- Evidence of goodwill,
- The total profitability of the business.

Using equations with the same numbering from *CVT* (Chapters Ten and Eleven) where appropriate, the corresponding valuations are calculated as follows

(i) **Minimum Valuation** (net tangible assets)

With 100 million shares in issue and a net tangible asset revaluation of £200 million we can derive a bid price of:

£200m /100m = **£2.00 per share**

(ii) **Goodwill Valuation** (capitalisation of super profits)

From Chapter Ten, the value of goodwill is represented by the right-hand term in the following *going concern* equation

(23) $V = A + [(P - rA) / m]$ Subject to $m > r$

Where:

V	=	going concern value of the business
A	=	value of net tangible assets
P	=	expected profits per annum
r	=	normal rate of return
P - rA	=	superprofit
m	=	capitalisation rate of surperprofit
(P - rA) / m	=	value of goodwill

The value term for goodwill can also be rewritten from a conventional accounting perspective in terms of its useful life.

(24) $V = A + [(P - rA) / (1/m)]$ Subject to $m > r$

Where:

(1/m)= a number of years purchase of superprofit

Using the acquisition investment profile prepared by Stripes, we can therefore derive:

Goodwill computation: (P - r A) / m

Post-acquisition profit: 10% on £200m £20.0 m

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Less *normal* profit (given)	£ 5.0 m
Super profit	£15.0 m
Capitalised at 20% (i.e. 5 years purchase)	£75.0 m

Going concern valuation: V = A + (P - r. A) / m

V = £200m + (£20m - £5m) / 0.2 = £275 million

With 100 million shares in issue we can derive the following bid price:

£275m /100m = **£2.75 per share**

(iii) **Profitability Valuation:** (capitalisation of future earnings)

If we assume that profits are constant in perpetuity, the going-concern value of a target company can be defined using two equations from Chapter Eleven, depending on the data available:

(25) $V = \Pi(1 - t) \times P/E$

(26) $V = \Pi (1 - t) / K_e$

Where:

V = going concern value of the business
Π = expected profits at the valuation date
t = rate of corporation tax
P/E = price-earnings ratio
K_e = earnings yield

If profits grow at a constant rate in perpetuity (g) we can also rewrite Equation (26) using the constant growth formula explained in Part Two, based on anticipated post-tax earnings one year after takeover:

(27) $V = [\Pi (1 - t)] (1 + g) / K_e - g$ subject to the proviso that $K_e > g$ for V to be finite.

Using the information prepared by Stripes, which ignores growth, we can therefore apply Equation (26) to capitalise post-acquisition profit at 10% as follows

$V = \Pi (1 - t) / K_e$ = £20 m / 0.10 = £200m

And dividing by the 100 million shares in issue, we can derive the following bid price:

£200m /100m = **£2.00 per share**

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3. Commentary

   Ozzy's mediocre stock market performance (confirmed by the £25 million shortfall between the market capitalisation of equity and nominal value) may explain why the asset revaluation prepared by Stripes, not only exceeds the market capitalisation, but also equals the profitability valuation. But why does the *going concern* value (using net assets plus "goodwill") exceed the *profitability* valuation (which is based on the assets' earning power capitalised at the post-acquisition rate of return)?

   Moreover, what is so special about the company's *intangible* assets to justify their acquisition at such a high-risk price? Note that the capitalisation rate of superprofit (m = 20 per cent) is twice the normal rate of return (r = 10 per cent).

4. A Risk Analysis

   The *tangible* assets are important in any managerial risk assessment of corporate takeover. If the net assets divided by the market capitalisation of profits "cover" the price of investment significantly (*i.e.* the *asset backing* is high) or its reciprocal (the *valuation ratio*) is greater than one, this may compensate for corporate failure post-acquisition if the assets need to be sold off.

   You will recall from *CVT* (Chapter Eleven) that the purchase value of tangible assets relative to a profitability valuation (asset backing) is measured by the following equation:

(28) Cover = Net asset valuation /Profitability valuation

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The acquisition can also be assessed by the *reciprocal* of cover, using the *valuation ratio*

(29) Valuation ratio = Profitability valuation / Net asset valuation

Using the target data, we can evaluate the asset cover and valuation ratio if Stripes is willing to pay a capitalised profit figure of £200m for assets valued at £200m as follows:

- Cover = Net asset valuation /Profitability valuation = 1.0
- Valuation ratio = Profitability valuation / Net asset valuation = 1.0

The value of the tangible assets (*asset backing*) completely covers the profitability valuation

The acquisition can also be justified (but only just) since the profit earning capacity of the business equals the net assets as evidenced by the reciprocal of the cover: namely the *valuation ratio*.

5. Conclusion
   As mentioned earlier, if a profit valuation equals a net asset valuation, the question predatory management must answer is where is the goodwill? We suggested earlier in this text (see the Summary and Conclusions to Chapter Five) that perhaps Ozzy plc is worth more "dead than alive" and only ripe for *asset stripping*.

   Stripes could definitely make an initial bid that flatters the current share price of 75 pence, moving up to a profitability valuation of £2.00 covered by the assets with little risk. However, beyond this figure, any going concern valuation that incorporates goodwill suggests that the purchase of say a brand name, unsupported by profits, requires:

A radical reassessment of the forecast acquisition data, an allowance for growth, or alternatively a better company to complement Stripes' existing activities

Exercise 7.2: A "Promising" Takeover Valuation

Riding on the back of domestic economic growth, the Mantra Company is an Indian cash-rich conglomerate that wishes to expand its global operations with European facilities.

Through inept management, the highly regarded Rock Company based in the north of England with mining operations throughout the Europe has recently suffered a reversal of fortune. Share price has plummeted, so much so, that Mantra regards their takeover as a perfect fit for its existing activities.

The Balance Sheet for Rock reveals the following:	(£million)
Share Capital: £1.00 ordinary shares	1,200
Reserves	6,432
CAPITAL EMPLOYED	7,632

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Mining property			4,200
Equipment			1,200
Distribution Facilities			900
Vehicles			120
			6,420
Investments			1,050
Current Assets:			1,212
Current Liabilities: Taxation	750		
Creditors	300		
		1,050	
			162
			7,632

As a basis for acquisition, Mantra believes that Rock's post-takeover turnover and profits should be in the region of £33,000 million and £1,500 million, respectively. The company has also prepared the following data relating to the acquisition.

- A 15 per cent incremental return on any new asset investment.
- A five year assimilation of goodwill, equivalent to a 20 per cent return on superprofits.

Rationalisation policies	£million
Sale of equipment	1,263
Sale of investments at market value	1,122
Annual cost savings from sale of equipment	207
New construction costs	630

Required:

1. Prepare a series of bid prices per share, using any assumptions you care to make, based on the information available and the following valuation techniques.
- Tangible assets
- Goodwill
- Profitability

2. Provide a risk assessment of your valuations.
3. Summarise your bid strategy

An Indicative Outline Solution

1. A Range of Bid Prices per Share

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(i) **Minimum Valuation** (net asset revaluation)	£million	Assumptions
Mining Property	4,200	Current Valuation
Distribution Facilities	900	Current Valuation
Sale of Equipment	1,263	Realisable Value
Vehicles	120	Current Valuation
Investments	1,122	Current Valuation
Net Current Assets	162	Current Valuation
Total Asset Value	7,767	

With 1,200 million shares in issue and a net tangible asset revaluation of £7,767 million we can derive a minimum bid price of:

£7,767m / 1,200m **£ 6.50 per share** (say)

(ii) Goodwill Valuation (using the capitalisation of superprofits)

Goodwill computation: (P - r. A) / m	£million	Assumptions
Forecast profit per annum	1,500	Given
Less *normal* profit (15% return on £7,767m)	1,165	Incremental return
Super profit per annum	335	
Capitalised at 20% (5 years purchase)	1,675	i.e. m > r

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Going concern valuation: V = A + (P - r. A) / m

V = £7,767m + (£1,500m - £1,165m) / 0.2 = £9,442 million

With 1,200 million shares in issue we can derive the following bid price:

£9,442m / 1,200m **£7.90 per share** (say)

(iii) **Profitability Valuation:** (capitalisation of future earnings)

	£million	Assumptions
Forecast profit per annum	1,500	Given
Cost saving per annum	207	Given
Forecast profit per annum	1,707	
Capitalised at 15%	11,380	Incremental return
Add: Sale of equipment	1,263	Given
Sale of investments	1,122	Given
Less: New build	(630)	Given
Total Profitability Valuation	13,135	

So, dividing by the 1,200 million shares in issue, we can derive the following bid price:

£13,135m / 1,200m **£10.95 per share** (say)

2. Risk Assessment
   Although we have no precise information on the current market price for Rock, its mediocre stock market performance explains Mantra's predatory interest. Our range of bid prices per share also reveals an ideal "domino" effect.

The profitability valuation exceeds the going concern valuation (incorporating any remaining goodwill), which is higher than the current market valuation of assets. The latter also exceeds the total Balance Sheet value of assets

However, if profits do not materialise, or the residue of goodwill evaporates post-acquisition, then Mantra may have a problem. Their return on investment will be no more than the realisation of Rock's assets.

To assess the risk of a *worst-case* scenario using the information available, we can compare the purchase value of net tangible assets in relation to a profitability valuation. What is termed *asset backing* can be measured in one of two ways, using either market capitalisation (total value) or bid price per share.

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Cover = Net asset valuation /Profitability valuation
Valuation ratio = Profitability valuation / Net Asset valuation

Remember from your previous Exercise that the valuation ratio is the simply the *reciprocal* of the cover. So, we can define (with rounding) the two equations, either in aggregate, or on a per share basis, as follows.

- Market Capitalisation
  Cover: Net Asset Valuation/Profitability Valuation = £7,767m / 13,135m = 60%
  Valuation Ratio: Profitability Valuation/Net Asset Valuation = £13,135m / £7,767m = 1.7

- Bid Price
  Cover: Net Asset Valuation/Profitability Valuation = £6.50 / £10.95 = 60%
  Valuation Ratio: Profitability Valuation/Net Asset Valuation = 1 / Cover = 1.7

The purchase value of Rock's net tangible assets (*asset backing*) only supports sixty per cent of Mantra's profitability valuation. But to access a new market that complements existing activities premised on global growth is a *rational* strategic manoeuvre, particularly if the target company's shares are a bargain buy.

3. A Bid Strategy

Mantra could make an initial bid of £6.50 but a fairer price might be £8.00, if only to flush out other predators. In the event of a "bidding war", price might go higher still. Mantra can bide its time, and progressively up its offer to £11.00. Beyond this, much depends on the strength of its *objective*, strategic pre-planning, attitude toward risk and how the market values Rock's shares

Summary and Conclusions

Having illustrated the methodologies for a number of different share valuation models and evaluated their relative strengths and weaknesses, it is important to emphasise that it is unwise to depend on any one method. Indeed, the juxtaposition of share prices using different models not only provides benchmarks for a bid strategy, but also room for manoeuvre post-acquisition.

For example, we observed in *CVT* (Chapter Ten) that if a takeover is not part of a carefully conceived corporate plan, reflecting factors other than earnings (for example a net tangible asset "break-up" valuation) the predator may inherit a negligible return on investment that is not dissimilar to takeovers premised upon *subjective* managerial goals of growth, prestige and security.

Prospective mergers may also elicit rising expectations on the part of existing shareholders and all other stakeholders of the target company (including, employees, customers, creditors and other financiers) as well as potential investors. And if their ambitions are not fulfilled after the event, any serious demotivation will detract from goodwill. Confidence may evaporate rapidly and the equity price of the acquiring company in its new form will tumble.

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At a macro level, the volatility of today's global capital markets and their individual shares, created by serial financial crises, economic recession and political instability, all mean that investors (private, institutional, or corporate) can no longer rely on simple "number crunching".

Every stock market constituent needs a thorough understanding of theoretical share valuation models (whether they be asset, earnings, dividend and cash based) to comprehend the underlying factors that determine their future investment and financial decisions.

Selected References

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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 %

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

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

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

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

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

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

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3. Earning Measures (net of corporation tax)

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

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

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

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

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

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

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

4. The Relationship Between Dividends and Earnings

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

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

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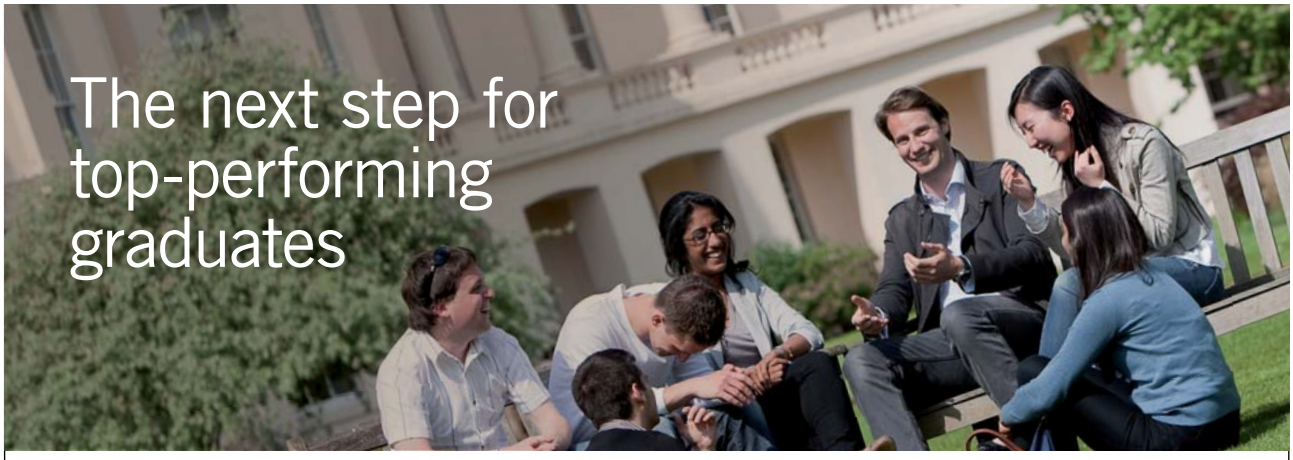
$$\text{Dividend payout ratio} = \frac{1}{\text{Dividend cover}} \times 100$$

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

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



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