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AUTHORS	Roger Lister

ARTICLE INFO	Roger Lister (2005). Cost of capital: the case for the prosecution. *Investment Management and Financial Innovations*, *2*(2)
RELEASED ON	Friday, 27 May 2005
JOURNAL	"Investment Management and Financial Innovations"
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES
0

NUMBER OF FIGURES
0

NUMBER OF TABLES
0

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Cost Of Capital: The Case For The Prosecution

Roger Lister

Abstract

Management should end the costly search for their cost of capital in view of the confluence of several interrelated conceptual and practical reasons. The universally used definition is seriously deficient. There is dispute as to whether cost of capital expresses investors' rational demands. On top of this there is accumulating evidence that any such rational demands are obscured by the influences of a host of irrational decision criteria. Furthermore there are insuperable measurement difficulties. Any measurements which emerge are subject to such disagreement as to be of virtually no practical value. These problems are compounded when attempts are made to adapt cost of capital to the specific circumstances of an enterprise. Any such attempt requires assumptions which are so heroic that they undermine the usefulness of the resulting estimate. Current practice is untutored, inconsistent and incomplete and therefore cannot be used as a source of guidance. Pending new insights, cost of capital should therefore be relegated to the position of a theoretical construct of no practical significance.

Key words: cost of capital, financial structure, capital investment appraisal, equity risk premium.

Introduction

An enterprise's cost of capital is, conceptually, the meeting point between financial investors and management. The former make a twofold sacrifice: they exchange present, certain consumption opportunities usually in the form of cash for future, uncertain consumption opportunities in the form of shares or bonds or other corporate securities. They expect managers to compensate them for their sacrifice in the form of both a reward for waiting and a reward for risk. The total reward which investors demand is the company's cost of capital. If management produces more than investors require then the value of securities rises. All this is evident in concept. However the present paper submits that it is a waste of managerial time to seek their cost of capital: useful selection and measurement of the parameters are simply impossible. The result is doomed to be economically meaningless. Present practice resorts complacently to a ragbag of simplistic tools. Perhaps most disturbing aspect of practice is the seeming gulf between the providers and users of capital. For example Gregory, Rutterford and Zaman (1999) found in their survey that "on average the City appears to view the cost of capital as being lower than the average corporate estimate. This suggests a possible lack of communication".

Management today accordingly confronts a set of deeply disturbing questions:

1. What are the components of the cost of capital? Can these be usefully defined?
2. Which parameters of the components are relevant to computing the cost of capital?
3. Can the parameters be measured with any useful degree of accuracy?
4. Can the components be adapted for an individual enterprise and its plans?
5. What lessons can be gleaned from present practice?
6. Should management abandon cost of capital as a decision criterion?
7. Is there a more relevant and practicable concept?

To set the following discussion into context it is useful to begin by recalling how cost of capital, conceptually, impinges on value. This impact is particularly clear in the idea of economic value added, developed by Stern Stewart & Co as EVA$^{\rightarrow}$. EVA is conceptually rooted in economic income, the value created beyond the normal expected return on any particular category of investment.

EVA→	
£m	
Equity shareholders' investment	1000
Bondholders' investment1	1000
Capital invested	2000
Net operating profit after tax (NOPAT)	100
Cost of equity capital	4%
Cost of bondholders' capital	2%
Weighted average cost of capital (WACC)	3%
NOPAT - Capital invested x WACC	= EVA→
100 - 60	= 40

Components of cost of capital

Conventionally WACC is the cost of long-term finance, incorporating the two main costs: debt and equity. This seductively plain definition is misleading, restricted as it is to the capital contractually in place or planned to be in place. It will be useful to examine WACC in the company of McKinsey & Co (2000):

$$WACC = k_b\,(1 - T_c\,)(B/V) + k_p\,(P/V) + k_s\,(S/V)\,,$$

where

k_b = pretax market expected yield to maturity on non-callable, non-convertible debt.
T_c = marginal tax rate for the entity being valued allowing for carry-forwards, carry-backs, losses, depreciation allowances and double taxation relief.
B = market value of interest bearing debt.
V = market value of the enterprise being valued, $B + P + S$.
k_p = pretax market expected yield to maturity on non-callable, non-convertible preferred stock.
P = market value of non-callable, non-convertible preferred shares.
k_s = market determined opportunity cost of equity capital.
S = market value of equity shares.

This definition is inadequate for a modern sophisticated business. An enterprise should not restrict cost of capital to capital in place. Management should take account of 1) capital equivalents, 2) contingent capital, and 3) capital which lies outside its stewardship but which is available.

Capital equivalents are embodied in the idea of Total Average Cost of Capital (TACC), a term espoused by Shimpi (1999). TACC looks beyond capital contractually raised or targeted for the future. TACC takes account of overall enterprise risk management. Total capital includes capital equivalents like insurance contracts. Such contracts reduce risk, reassure investors and reduce the cost of capital. In this sense insurance is a direct substitute for a cushion of incremental equity finance in the form of retention or rights issue.

How should management incorporate such capital equivalents into the cost of capital? If, for illustration purposes, capital equivalents are restricted to insurance, then the firm's capital comprises debt capital + equity capital + insurance capital. Insurance capital is the amount of capital replaced by the decision to insure: its value is the risk-bearing equity capital which does not need to be raised thanks to the protection provided. How is the cost of this insurance capital calculated? In practice this is extremely difficult since it is not directly observable in the capital market. Conceptually it is the expected annual insurance premium divided by the insurance capital. TACC can now be formulated as:

cost of debt x debt value/firm value
+cost of equity x equity value/firm value
+cost of insurance x value of insurance capital/firm value.

In addition to contractual capital and capital equivalents, contingent capital impinges on cost of capital but is ignored in WACC. It comprises the contingent liabilities and assets of the business. These include pension commitments, options held and written by the company such as credit derivatives; also financial guarantees. If materially likely to crystallise, these contingent claims should be valued as relevant assets and liabilities in any cost of capital scheme. Indeed the bond-like character of contingent pension commitments is already enshrined in International Accounting Standard 19 and the UK's FRS 17. These require that the present value of the expected future liability to pay retirement benefits that have been earned by past service should be shown in the balance sheet of the employing entity. The discount rate to be used in this computation has to be based on a high quality corporate bond rate.

The financial guarantee is contingent capital in one of its most pure forms.

Financial guarantees may stand alone; they may form part of an investment decision or may be a part of financing architecture as in the important case of asset-backed securitisation (Lister, Baker and Ross, 2003). Asset-backed securitisation (ABS) is typically effected by forming "bullet-proof" special-purpose vehicles (SPV's). Into the SPV the assets are transferred which the company wishes to use as an explicit basis for finance. Securities are then issued by the SPV tailored to the assets' flows and investors' needs. Since ABS investors are typically highly risk-averse the SPV must qualify for the highest possible safety rating. Guarantees have a key role here, sometimes in the form of a web of intra-group sureties as well as guarantees with banks, insurance companies and other intermediaries.

To retail investors corporate financial guarantees are of growing importance too. Large sums of money are pouring into stable-value funds in the United States. These are fixed income funds which use guarantees from banks and insurance companies to circumvent the risk which rising interest rates cause to their principal value. The guarantee enables the investor to realise the higher yield of an intermediate bond fund without recourse to instruments of lower duration. A guarantee with a material chance of being invoked amounts to gearing and should reduce the equity weighting in the cost of capital. The value of contingent liabilities and assets should be calculated with the help of the option pricing model, the financial reporting criteria and relevant law. The result belongs to the definition of cost of capital.

In addition to existing contractual capital, capital equivalents and contingent capital, capital which is available but not yet employed may determine the equity weighting within WACC. Potential shortage of available capital both encroaches on what is truly available to equity and increases its cost; while resources that can be liberated offset gearing in the eyes of investors and others. A company which is short of capital should furthermore look to its total risk when calculating its cost of equity, and not the systematic risk that is advocated in the textbooks. This distinction is pursued later.

Capital availability tries to express a key business metrics: financial mobility, financial room for manoeuvre. In practical terms this tells the ease with which it can respond to financial emergencies and opportunities. Financial mobility can be assessed by preparing an inventory of resources of mobility. This was first formalised by Donaldson in 1969 and his scheme continues to be reproduced in today's writings (e.g. Stern & Chew, 1998). Resources take in contractual, contingent and other available funds including those which can be liberated by changing operations. In summary (Donaldson, 1969):

Resources of mobility

- Uncommitted reserves
  - Instant (e.g. unused credit line)
  - Negotiable (e.g. debt issue)
- Reduction of planned outflows
  - Volume-related (e.g. change in production schedule)
  - Scale–related (e.g. administrative overheads)
  - Value-related (e.g. dividend payments)
- Liquidation of assets

Land, plant and machinery
Business units

Parameters of the cost of capital

The previous section discussed the resources which determine the cost of capital. Which characteristics – which parameters – of these resources are relevant to measuring the cost of capital? There is widespread reliance on the capital asset pricing model (CAPM). CAPM was developed by Sharpe (1964), Lintner (1965) and Black (1972) drawing on the work of Markowitz (1952) and Tobin (1958). Refined over half a century, CAPM proposes that investors demand compensation only for "systematic" risk. This is a measure of the extent to which an investment's volatility is correlated with the market. CAPM argues that all other risk is unique and can be avoided by holding a collection, a portfolio, of investments within which unique risk will be diversified away and cancel out.

The systematic risk of a share is expressed by its beta coefficient. A corporate plan with a beta of 1 mirrors the fluctuations of the market. A plan with a beta of more than 1 exaggerates the fluctuations of the market. A plan with a negative beta moves against the market, reducing the risk of a portfolio: it is like an insurance policy. A plan with a beta of zero fluctuates independently of the market: all of the plan's risk is unsystematic. CAPM says that investors will regard such a plan as effectively riskless. Systematic risk by contrast is the economy-wide, unavoidable, inescapable risk that affects virtually all investments. The expected return on a given share or project in a world where CAPM pertains can be expressed as follows:

$$E(R_j) = R_f + \beta_j [E(R_m) - R_f].$$

$E(R_j)$ and $E(R_m)$ are the expected returns to asset j and the market portfolio, respectively; R_f is the risk free rate, and β_j is the beta coefficient for asset j. β_j measures the tendency of asset j to co-vary with the market portfolio. It represents the part of the asset's risk that cannot be diversified away. The lesson for management seems straightforward: if the corporate plan has high systematic volatility, a high beta, investors will require a high return as compensation for risk.

The ideal assumptions underlying CAPM – no taxes; normal distribution of returns; standard deviation as proxy for risk; risk-averse investors; no dealing costs; perfect information; ability to borrow and lend at the risk-free rate – do not hold. But they can to an extent be adjusted for without fundamentally vitiating the model. Tax can be incorporated conceptually into the cost of debt and equity. Standard deviation may not, however, capture all risks as conceived by shareholders. Investors may show elements of risk-seeking, especially in extreme corporate circumstances. Dealing and other transaction costs exist but in today's liquid markets may not materially come in the way of portfolio adjustments. Information asymmetry and incompleteness clearly pertain despite the best efforts of regulators. Using efficient set mathematics, Black (1972) took account of borrowing and lending restrictions.

Ross (1976a, 1976b) addressed the restrictive assumptions of CAPM by developing arbitrage pricing theory (APT). APT starts with the premise that arbitrage opportunities should not be present in efficient financial markets. Ross' assumptions are much less restrictive than those required to derive the CAPM. The APT starts by assuming that there are n factors which cause asset returns to systematically deviate from their expected values. The theory does not specify how large the number n is, nor identifies the factors. It simply assumes that these n factors cause returns to vary together. There may be other, firm-specific reasons for returns to differ from their expected values, but these firm-specific deviations are not related across stocks and can be diversified away. Based on these assumptions, Ross shows that, in order to prevent arbitrage, an asset's expected return must be a linear function of its sensitivity to the n common factors:

$$E(R_j) = R_f + \beta_{j1}\,\lambda_1 + \beta_{j2}\,\lambda_2 + \ldots + \beta_{jn}\,\lambda_{n.}$$

R_j and R_f are defined as before. Each β_j coefficient represents the sensitivity of asset j to risk factor 1, 2 etc. The λ's represent the additional return an investor requires to compensate for

the risk borne for each factor. Unanticipated inflation, the term structure of interest rates and bond default risk premiums appear to be important as variables. Burmeister and McElroy (1988) found APT to be better than CAPM by using default risk on bonds, term structure of interest rates, unanticipated inflation, change in expected sales and return on the market portfolio insofar as not captured by the first four factors. Pastor and Stambaugh (2001) specified that risk in the form of sensitivity to market-wide shifts in liquidity may explain relative returns.

Any hopes derived from such models are dampened by studies such as Haugen and Baker's (1996) work based on five countries. They found that none of the factors related to sensitivities to macroeconomic variables seemed to be important determinants of expected returns.

CAPM depends on a meaningful definition of market portfolio of investments against which the fluctuations of a project or investment can be measured (Roll, 1977). A true market portfolio would need to include equities world-wide, commodities, real estate, cash, human capital as well as the range of tangible investments such as works of art and jewellery. A reliable comprehensive definition is not presently available.

Even if CAPM could be modified towards removal of its unrealistic assumptions, there are serious doubts as to whether CAPM expresses investors' preferences. These doubts arise under two headings. First, markets may be efficient but CAPM may fail to capture the parameters of concern to rational economic investors (Malkiel, 2003). Second, markets may be inefficient: investors may be irrational such that prices are not formed in accordance with a CAPM founded on market efficiency. The market may fall significantly short of efficiency as defined, for example, by Fama (1995):

> *"An 'efficient' market is defined as a market where there are large numbers of rational, profit-maximizers actively competing, with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants. In an efficient market, competition among the many intelligent participants leads to a situation where, at any point in time, actual prices of individual securities already reflect the effects of information based both on events that have already occurred and on events which, as of now, the market expects to take place in the future. In other words, in an efficient market at any point in time the actual price of a security will be a good estimate of its intrinsic value".*

An inefficient world is one which is significantly vulnerable to irrational psychological factors, social movements, noise trading, fashions and to the caprice of wayward investors in a speculative market. Such a world, best understood by psychologists, contrasts sharply with the notion of a long term "rational investor" attempting to make objective calculations. It is more akin to Keynes' casino guided by animal spirit (1936). Keynes envisages the investor as confronted by uncertainty as opposed to risk, being unable to estimate probabilities. They fall back on cognitive heuristics in order to reduce decisions to manageable proportions.

The first possibility – that markets are efficient but that CAPM is failing to capture the parameters of concern to rational economic investors – is evidenced by phenomena which seem irrational but which can be rationalised.

Crashes and Bubbles

According to some opinions, crashes and bubbles are the result of naïve investors with frenzied expectations of instant wealth who chase trends. Yet the rational bubble theory suggests that rational investors will continue buying in an overvalued market if they think the potential profit greatly exceeds the potential loss. As prices rise the potential loss increases and the bubble bursts. In this sense bubbles and crashes can be rationalised. Many said at the time of the 1987 crash that some weeks of external events, minor in themselves, cumulatively signalled the end of a favourable political and economic climate for equities. Investors in sufficient numbers came to believe that they were holding too large a share of their wealth in risky equities. Malkiel (2003) showed how relatively small changes in key variables such as the yield on government bonds, growth and perceived risk

could combine to considerably reduce the value of a stock index. Concerning the internet bubble he chided those who were wise after the event by asking them, rhetorically:

> *"Who could be sure, with the use of the internet for a time doubling every several months, that the extraordinary growth rates that could justify stock valuations were impossible?"*

Taxation

Taxation may cause investors not to comply with CAPM's prescriptions. Portfolio adjustments may precipitate capital gains tax. There may be insufficient companies with dividend policies tailored to investors' tax-planning needs.

Size

Banz (1981) and Basu (1983) were among the first to suggest that *ceteris paribus* small firms achieved higher average returns than large firms. Rational explanations are that high returns compensate for higher risk, that small firms are neglected by large influential analysts so that their good news can be profitably identified before it is generally known, that transaction costs are higher for dealing in small firms' shares, and that size may be a better proxy for risk that beta. The size effect was not prominent from the mid 1980's to the end of the century possibly indicating a reassertion of efficiency here.

Dividend yield

There is evidence that dividend yield can predict returns (Fama and French, 1988; Campbell and Shiller, 1988). Buying at an initial high dividend yield may produce abnormal returns, but, as with sixe, this has not been demonstrable since the mid 1980's. The decline in the effect may be due to more sophisticated methods of distribution by companies. The dividend yield effect may be reconcilable with market efficiency in so far as dividend yields tend to be high when interest rates are high and *vice versa.* Thus the ability of yields to predict returns may reflect the stock market adjusting to general economic conditions.

Book/Market value ratio: Fama and French

Fama and French (1992; 1993) studied size, earnings/price ratio, book/market value ratio and beta together in their cross-sectional study. They attributed the seeming relationship between beta and average return to the negative correlation between size and beta. In addition to size their study appeared to confirm that stocks with a high book to market value ratio (sometimes called value stocks) yielded high returns.

Fama and French proposed rational explanations for size and book value (1996). Their three-factor model showed that small-capitalisation stocks and value stocks have high sensitivity to the risk factors. Book/market and size appeared to capture macro-economic risk factors that are important determinants of stock returns. Perez-Quiros and Timmerman (2000) argued that the high returns on small firms may be compensation for suffering under conditions of credit restriction. The Fama-French findings may capture the effects of real options.

The rational risk explanation is disputed by Daniel and Titman (1997) who attributed the high returns to some intrinsic characteristic of the variable such as the possible fact that value stocks precipitate overreaction on investors' part. Some attribute both book/market effect and size effect to the fact that the market portfolio used in CAPM tests is not the true market portfolio. It will be recalled that Roll seminally argued (1977) that unless the true market portfolio is observable the CAPM is simply untestable.

Occasionally but a few steps beyond the seeming value security stands the distressed security. Investment gurus sometimes purport to exploit market inefficiency in the form of the mispricing of distressed securities. But rigorous research has tended to find that the mis-pricing is apparent rather than real (Altman and Eberhart, 1994).

One of the criticisms faced by Fama and French was of data mining whereby if a large enough sample is sufficiently trawled, sought after patterns can be found (Black, 1993). Black further argued that the statistical tests were not properly specified. Yet Barber and Lyon's results

(1997) militated against the data mining argument by evidencing the size relationship from an independent sample. Fama and French themselves (1998) successfully used an independent sample from a number of countries for 1975 to 1995. Their results were consistent with those of Capaul, Rowley and Sharpe (1993) who looked at five developed countries for 1981 to 1992.

Other critics of Fama and French pointed to the omission of companies which did not survive the period of study. Failed companies are likely to have high book to market value ratios but low returns (Kothari Shanken and Sloan, 1995). But Chan, Jegadeesh and Lakonishok (1995) argued that the lost cases are too few to have a significant impact. Kothari Shanken and Sloan (1995) proposed that Fama and French's use of monthly betas is less appropriate than annual betas, the latter conforming better to an investor's time horizon. Annual returns produce a more convincing case for beta.

The event studies of earlier times cast doubt on the strict efficiency of markets but tended to demonstrate that price settled to an efficient level in a very short time. Examples are Fama Fisher Jensen and Roll's study of stock splits (1969), McConnell and Muscarella's study of capital expenditure (1985), Klein's work on divestitures (1986) and Jensen and Ruback's on takeovers (1987).

The above review shows that several so-called anomalies, while limiting CAPM, could occur in rational efficient markets. CAPM has simply failed to capture the influence of these parameters. However, other anomalies are stronger indications of inefficiency.

Leverage

High leverage has been found to coincide with high returns even after allowing for beta and size differences (Bhandari, 1988).

Price/Earnings ratio

Seminally in 1934 Graham and Dodd found that firms with low Price/Earnings (P/E) ratios achieved superior returns. Basu further found in 1983 that the phenomenon did not only apply to small capitalisation stocks. In 1989 Jaffe Keim and Westerfield demonstrated that this was not explicable as a calendar effect whereby the price/earnings contradiction of CAPM surfaced only in January. Campbell and Shiller (1998) attributed up to 40% of the variance of future returns to initial P/E differences. Psychologists (Kahneman and Riepe, 1998) pointed out that these findings are consistent with investors who overconfidently assess their ability to project high earnings growth. Consonant results have been reported for the cash flow/earnings ratio (Hawawini and Keim, 1995). Some tests of low P/E stocks have shown them to be marginally poor, e.g. Schwert (2001), who looked at the 1993-1998 period.

Calendar effects

Numerous calendar effects have been proposed. For example, it has been suggested that prices rise abnormally in the first few days of January (Rozeff and Kinney, 1976; Bhardwaj and Brooks, 1992; Eleswarapu and Reinganum, 1993; Maxwell, 1998). The explanation based on investors selling at the end of the year and re-purchasing in the new year to create tax losses is debatable since the phenomenon occurs in countries where there is no capital gains tax and for companies which were not loss-makers. Some recent literature (Schwert, 2001) has argued that the January effect virtually faded as it gained publicity.

It has been suggested that shares' movements occur mostly in the first five days of the month and that abnormal profits are achievable in the first 45 minutes of daily trading. The weekend or Monday effect says that weekends are bad for shares (French, 1980; Kamara, 1997; Steeley, 2001). One explanation for this is that companies tend to release bad news over the weekend. There is evidence that returns are higher on the last day of the month (Ariel, 1987; Cadsby and Ratner, 1992). One of the oldest supposed irregularities is that high returns are available on the eve of a holiday (Brockman and Michalyuk, 1988). And there persist many more or less unproven adages including "sell in May and go away", buy on Tuesday and sell on Thursday, and heed the weather forecast since there may be opportunities for abnormal returns on sunny days (Saunders, 1993; Hirshleifer and Shumway, 2001).

Long-term reversal

This phenomenon is the argument that shares with a succession of poor returns will have a relatively good chance producing above average returns in a subsequent period. Fama and French (1988) found that 25 to 40% of the variation of long term returns was negatively correlated with past returns. Poterba and Summers' results were consonant (1988). This favours the contrarian strategy of investing in stocks or sectors which have been out of favour for a long time.

Momentum

This means that stocks with short term good performance will continue to perform well at least in the short term; and *vice versa* for stocks with a poor short term record (Jegadeesh and Titman, 1993). Early work (surveyed for example in Cootner (1964)) tended to contrast with later work (e.g. Lo and MacKinlay, 1999; Lo Mamaysky and Wang, 2000). Earlier work typically observed a lack of short run serial correlation between successive prices whereas the later tended towards rejecting the hypothesis that stock prices behave as random walks. Apparent underreaction to good news and overreaction to bad news could also be explained by the immediate impact of uncertainty which is gradually resolved. Fama (1998) found that underreaction is as frequent as overreaction and Malkiel (2003) argued likewise.

The possible existence of predictive anomalies like the foregoing does not necessarily lead to opportunities for abnormal profits. Transaction costs may erode such possibilities (Odean, 1999; Lesmond, Schill and Zhou, 2001).

The host of anomalies reviewed above would be sufficient to challenge the reliability of a number for cost of capital which depends on the behaviour of an economically rational investor. Incredulity is reinforced by seeing how psychologists categorise irrational behaviour.

Cognitive heuristics lead to systematic, unreasonable biases. The assumption of risk aversion may be a simplification. Brabazon (2000) identified nine instances, five heuristic and four which particularly reflect subjective mental accounting. In the former category are representativeness, overconfidence, anchoring, gambler's fallacy and availability bias. Representativeness is when certain characteristics, e.g. past events, are irrationally taken as predictive. Overconfidence leads to illusions of predictive skill with consequent overtrading. Anchoring is the tendency to allow a decision to be guided by irrelevant points of reference (e.g. recent price or historic cost). Gambler's fallacy is faith in regression to the mean. Availability is placing undue weight on easily available information. These patterns are observed among institutional as well as small investors.

Subjective mental accounting includes loss aversion, regret aversion, irrational overall portfolio appraisal and self-control. Loss aversion means that people see a higher penalty in a given loss than in a given gain: therefore losing shares are not realised. Regret aversion may also prompt retention of poor shares to avoid recognising a loss. Irrational overall portfolio appraisal is the tendency to view shares individually rather than as a portfolio when making decisions. This can lead to combinations of risk-averse and risk-seeking behaviour. Self-control is exemplified by the use of dividends to control consumption. Psychologists are well aware of the implications of their findings for the cost of capital, as in an answer given to Fama by one of their number (Fox, 2002):

> *"In answer to Fama's question of how they plan to calculate the cost of capital in a world where prices are incorrect, the behaviouralists say that for the purposes of such calculations, they'll just assume that prices are right."*

Market efficiency retains some eminent defenders despite the growing weight of contrary evidence. These include Fama (1998) who proposes that anomalies are not significant in the long term. Overreaction to certain types of information, he says, is as common as underreaction. Momentum – the continuation of abnormal returns after an event – is no more common than return reversal. Malkiel (2003) echoes Fama's defence of efficiency, insisting that, despite persistent evidence that inefficiencies pertain over long periods (e.g. return reversal), the stock market "is remarkably efficient in its utilisation of information…Periods such as 1999 where bubbles seem to have existed…are fortunately the exception rather than the rule." However, such reassurance is of little prac-

tical value to management if the reactions are so wayward that market price at any given time is significantly unreliable. And any complacency can only be dampened by studies such as Haugen and Baker's (1996) based on five countries to the effect that none of the factors related to sensitivities to macroeconomic variables seems to be an important determinant of expected stock returns.

Why should management devote expensive resources to guesstimating a cost of capital in the face of significant disagreement about its definition, about which parameters are relevant within the definition, about how far any definition succeeds in expressing even the rational demands of investors, and in the face of accumulating evidence that any rational demands are obscured by the influences of a host of irrational decision criteria? Cost of capital has withered down to an unreal, sterile, inaccurate expression of the preferences of historical creatures of accountants' imagination. Measurement problems reinforce this conclusion.

Measuring the parameters of the cost of capital

Even if management succeeded in correctly defining the components of the cost of capital and determining which parameters of those components mattered to investors, there would next loom the problem of measuring the parameters with a useful degree of precision. A graphic example is that of the tax shield connected with debt finance. The conventional definition of WACC assumes that the level and certainty of the future tax shield are substantially knowable. In fact the value of the relief depends on changes in the rates and allowances for corporate and personal tax nationally and internationally. Even if these were somehow ascertainable, the long term tax capacity of the business would need to be known since it crucially determines the value of the tax shield. Such capacity depends on the amount and profile of capital and other tax-sensitive cash flows over the period of the corporate plan. These will be highly dependent on how real options unfold. Also significant will be the tax capacity of the evolving investor population. It is accordingly unrealistic to assume that the tax shield can usefully be generalised across a corporation and over time. This inaccuracy appears to be almost a source of pride for one of the respondents in the survey by Gregory, Rutterford and Zaman (1999):

> *"We do not put in our real cost of debt. There are certain, for example tax driven, vehicles which give us actually quite a low cost of debt. The argument is how sustainable that is in the long term, given that it relies on certain countries'....fiscal policies. That does build up a nice margin of safety within the target [cost of capital], of course."*

And how management should weight debt in the WACC calculation if its market value is far from evident. For example if a bank loan is for £1mn this does not mean that the loan is worth £1mn. Its value is a matter of risk and the promised interest rates. Falling back on book value is widely recommended. This is grossly misleading, not least for companies in actual or potential distress; or for companies which enjoy a low fixed interest rate on well timed past borrowings. Book value is often entirely meaningless for equity given that asset values are usually a total of monetary costs incurred at different times over many years less depreciation calculated in ways which are economically indefensible. One would therefore expect a dismissive attitude to book value on the part of management – surprisingly not. Graham and Harvey's survey (2002) found that most companies and rating agencies calculated leverage as a percentage of book values.

Some simplification in WACC can be corrected. Management can, for example, adjust for leasing and other off-the-balance-sheet sources. In the case of finance leases where the commitment amounts to a long term deal to acquire the asset or to use it throughout its useful life, many countries now require these to be reported as debt. Such cases tend to find their way into the cost of capital. However, many leases escape inclusion by having been smartly drafted as "operating" leases despite their being effectively finance leases.

Acceptance or rejection of a major corporate plan may hinge on whether or not short-term sources of finance are included in capital. It is usually argued that if short-term borrowing is seasonal or offset by short-term financial investment then such borrowing may be excluded. The same argument should be extended to long-term borrowing. If financial instruments are held long-term

for income-earning purposes, then the gearing attributed to long-term borrowing should be cancelled by such negative gearing. This will apply to risky financial investments also in so far as their risk is offset by options, guarantees and other risk-reducing mechanisms.

WACC can also be adjusted for the liquidity of a company's shares. Lack of liquidity leads to a higher required return as investors seek compensation for associated costs. For example the costs of buying and selling a particular share may be high in the form of stockbrokers' fees or the spread between buying and selling costs. Illiquidity may reflect the danger of insider trading in the case of relatively uninformed investors.

The above approximations and assumptions are compounded in the case of internationally engaged companies, public sector corporations and unlisted companies. In the international case the problem of estimating a discount rate is vulnerable to the difficulty of meaningfully defining an international model for pricing capital including variations in the rate of time preference and the price of risk in segmented and imperfect markets. In the public sector case the seeming attraction of a government-set discount rate ignores the typical web of special guarantees, subsidies and contingent liabilities. To deal with the case of an unlisted company management typically falls back on using a calculated cost for a "similar" listed company and adding a premium for risk. In practice a meaningfully equivalent company is difficult to define among listed companies – how much more so in the unlisted case. And the premium added for risk or size may be the opposite of what is appropriate. The problem of the unlisted company is worsened further in so far as its shareholders are probably not classically diversified. Their substantial influential shareholdings and personal borrowing and lending may distort the risk signals implicit in the company's borrowing. An unlisted company is furthermore likely to suffer from constrained access to capital, making criteria based on listed companies' systematic risk entirely inappropriate.

Turning to beta, a calculated value based on history is of little practical use if it fluctuates wildly over time. The evidence is disturbing. In the UK, the beta of grocer J Sainsbury was 0.60 for the five years ended 1997 but 0.19 for the five years ended 2000 (Arnold, 2002). And similar differences show up according to whether hourly, daily or weekly or monthly or annual readings are taken. The impact of the difference on required return is dramatic as can be seen when figures are inserted into the following formulation.

Required return	= risk-free rate	+ beta (required return on market	- risk-free rate)
9.2%	= 5	+ 0.60(12	- 5)
6.33%	= 5	+ 0.19(12	- 5)

How furthermore can meaningful market-value weights be devised for the equity of companies whose shares have fluctuated between £2 and 20p in a period of 18 months, or which are unlisted? Should management constantly rebalance the capital structure at the behest of a highly volatile stock market?

Researchers have long sought to quantify the equity risk premium (ERP), that is to say the differential between the return which investors require on equities and the return on a risk-free asset. Attempts to estimate ERP usually begin with history. The arithmetic mean annual return on fifteen major economies' shares over the whole of the 20th century was found by Dimson, Marsh and Staunton (2001) to be 6.2%. But it is only necessary to look within the average to appreciate its unreliability. Ilmanen (2003) showed the ERP ranging from 0.7% per annum in the 1800's to 7.5% between 1950 and 1999 but dropping to 5.4% when the period is extended to 2002. Even if the historical average were less vulnerable, reliance on history would be highly dangerous. For example Fama and French (2001), by reference to the period of 1951-2000, estimated the return on equity using dividends and earnings at an annual 2.55% and 4.32% which is much lower than the average historical stock return of 7.43%. They attributed the difference to a decline in discount rates which is consonant with Brealey and Myers' reference to rising optimism and a reduction of the risk premium. Dimson *et al.* argued that productivity and efficiency growth, improvements in management and corporate governance, and technological change contributed to higher stock prices in the latter half of the 20th century.

It is also likely that investors' expectations were lower that what they actually achieved in the golden second half of the twentieth century. Achieved returns would imply an implausibly

high degree of risk aversion in a time of political and economic stability. More global diversification opportunities evolved. All these things conspired to suggest that the historic returns of the past century would not reliably recur. This leaves one unhappy about the view that no variable can predict the equity premium better than its own past average.

Dimson *et al*. were led to conjecture that "the expected equity risk premium on an annualized basis is around 3-4%; and on an arithmetic mean basis is around 4-5%" – specifically 3.7% for the UK market and 5.4% for the US. Their argument was based partly on prospective stability. This makes it permissible to wonder how the authors might now modify their conclusion in the light of stock market behaviour since they published their estimates and in the light of the new emerging threats to global stability.

Major new forces are coming to bear in the forthcoming decades. A significantly higher rate of savings must occur to ensure adequate pensions in retirement. This may well lead to lower returns to capital. Later, as the baby boom generation attempts to sell on their accumulated assets to the next smaller generation equity prices may fall. There is likely to be a shift from equities to bonds. As defined benefit pension schemes close and more people become dependent for their pensions on their own decisions, and as a new focus on risk management gains strength inside defined benefit schemes, and as the bond-like features of pension liabilities have to be reported in the accounts under accounting standards FRS 17 and IAS 19, the demand for bonds can be expected to increase to the detriment of equities. It was earlier noted that the discount rate to be used in the computation of pension fund liabilities is based on a high quality corporate bond rate. This alone signals the need for substantial coverage of the liability by safe bonds. In sum there are in play new, unique, economy-wide influences.

Only guesstimates can be made of how these things will impinge on the equity risk premium. Perhaps the most disturbing consideration is the wide range of estimates currently proposed. A selection of different methods and different results within methods lead to proposals ranging from zero to 7% (Harper, 2004).

Adaptation to the individual enterprise

Discussion up to this point has been about the cost of capital in general. But this is only the beginning of management's problems. They have to adapt the lessons to arrive at a number for their own company, within their company for their corporate plan, and within their corporate plan for its components.

This can be partly achieved by using adjusted present values (APVs). Here the plan is initially evaluated as though it were simply equity-financed. To the resulting value is then added the benefit or detriment of any financing side effects such as beneficial issue costs for debt, tax-subsidies and any artificially cheap debt obtained from public sources. A version of APV exists which adjusts debt in each future period to keep it at a constant fraction of future project value (Brealey and Myers, 2003).

A company-wide approach to adapting the cost of capital is known as the method of similars. The method attributes to a particular plan or division the average beta of a sample of companies engaged solely or largely in the same business. This immediately encounters the problem of unstable betas mentioned earlier as well as the problem of truly identifying a "similar". Another practice is to use the beta of the industry on the tenuous grounds that such a beta is more stable. Yet a further possibility is to opt for a beta of one, i.e. assume that the plan is a clone of the market. This is justified as drawing predictions towards the average reflecting the position that a company is one among many and therefore likely to be somewhat similar to the average of all companies. A compromise is for management to use a weighted average of industry and market beta. The more reliable they regard the industry beta, the larger will be the weighting assigned to that beta.

If management correctly revolt at the excess of such approximations, they might feel happier estimating a "fundamental" beta. This is done by first broadly equating the plan with a high or low beta industry and then adjusting the beta for relevant fundamental characteristics of the company. These include growth, earnings variability and size. Evidently this is a story of approxima-

tion upon approximation such that the result, especially given earlier arguments, is highly unlikely to be of any useful accuracy.

A further weakness of company-wide adaptation is that it fails to distinguish the corporate, strategic and tactical levels of decision making. Corporate cost of capital has a broad, long-term and qualitative role. Donaldson (1972) argued that "where stockholder opportunity cost really fits in, in an operational sense, is as a standard by which the chief executive and the board of directors review the company's performance and judge the success of the corporate strategy in the context of long-range planning." For regular decisions distinct strategic and tactical hurdle rates are more apposite. These must do more than simply distinguish the risks of different projects and strategic business units. For strategic investments like re-location and changes in the earnings mix, the best performance achieved by other divisions should be used as an internal hurdle rate. As an external discipline reference should be to the best return on investment achievable by expansion or acquisition. For shorter term, tactical investments needed to maintain existing earnings potential perhaps with a view to profitable sale of a unit, the unit's own best potential should be used as an internal hurdle rate with the best competitor's return serving as an external discipline.

Even if all the above adaptations were applied to management's satisfaction they would come up against a final decisive problem: the choice between discounting according to the systematic risk of a plan or according to its total risk. The earlier arguments for systematic risk may be inappropriate for some companies. For a financially immobile company total risk may matter most. Irremediable fluctuations in cash flows frustrate needs and opportunities. A constrained business easily loses the trust of its customers, suppliers, managers and other employees. There could be a loss of tax advantages. By contrast if a company has easy access to capital and its shares are publicly held by widely diversified investors who can trade in the shares without onerous costs then the systematic risk criterion should be favoured. But any attempt at adaptation is subject to the overriding problems of definition and measurement argued in this paper. If anything the *cri de coeur* of Gregory, Rutterford and Zaman (1999) understate the problem:

> *"From a firm's point of view, estimating the cost of capital is not an easy task since there is little academic agreement on which model to use or how best to use or how best to estimate the inputs into a model. For example, there is no commonly agreed theory of asset pricing, with the theoretically sound CAPM under attack for both its testability and its empirical support, and multi-factor models, such as Fama's three-factor model, lacking a robust theoretical framework. There is no agreement on to how to estimate the equity risk premium, needed to determine the cost of equity to firms, nor is there agreement on the impact of capital structure and dividend policy on the cost of capital…There is academic debate on whether firms should estimate the cost of capital by reference to a domestic market or an international framework".*

Practice

Practice combines the worst of all worlds. A caricature of traditional theory is applied in a world of self-made unreality. The survey quoted above found that where clear views were expressed on cost of capital – in only six out of their eight case studies – two opted for historical estimates of the risk premium, three opted for forward looking estimates, and one expressed ambivalence. The CAPM was used to estimate WACC, using a market risk premium based on long term historical averages. At the same time internal hurdle rates for individual elements of corporate plans arbitrarily exceeded the cost of capital which they estimated for the corporation. While postponement and growth issues were considered, option valuation techniques were ignored (Busby and Pitts, 1998), despite the fact that it is possible to proxy these albeit in a crude way through the hurdle rate (Stark, 1990). No attempt appeared to be made to decide between the relevance of systematic and unsystematic risk

Conclusion

The question addressed by this paper was as follows. In the present state of understanding is cost of capital of use to management? The answer has to be no. Several reasons can be adduced.

1. The almost universally used conventional concept (WACC) is significantly incomplete.
2. To complete it by reference to capital equivalents, contingent assets and liabilities and available capital are necessary but these cannot presently be calculated with useful precision.
3. The parameters of cost of capital relevant to investors have not been identified beyond serious doubt and widely differing opinion.
4. Measurement of the parameters is not feasible with any useful degree of consensus or accuracy.
5. Practitioners are behaving in an untutored, inconsistent and incomplete way towards the cost of capital.

In sum, managerial time devoted to the cost of capital is – for the time being – wasteful. Until new conceptual insights and applications are achieved management should relegate cost of capital to the position of a theoretical construct of no practical significance.

Epilogue

An argument against cost of capital does not depend on being able to propose a substitute. However, it is submitted for further discussion that financial mobility might usefully supplant cost of capital as a key decision criterion. Indeed some managements, by instinct or insight, may already have made the substitution. The senior financial officers surveyed by Graham and Harvey (2002) uttered a seeming heresy. Their main objective in setting debt policy, they said, was not to minimize WACC, but rather to preserve financial flexibility – a goal associated with maintaining a targeted credit rating and maximising the value of real options.

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