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An analysis of cost of capital, capital structure and capital budgeting practices: a survey of South African listed companies

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Abstract

This study employs a sample survey to determine and analyse the corporate finance practices of South African listed companies in relation to cost of capital, capital structure and capital budgeting decisions.

The results of the survey are mostly in line with financial theory and are generally consistent with a number of other studies. This study finds that companies always or almost always employ DCF methods such as NPV and IRR to evaluate projects. Companies almost always use CAPM to determine the cost of equity and most companies employ either a strict or flexible target debt-equity ratio. Furthermore, most practices of the South African corporate sector are in line with practices employed by US companies. This reflects the relatively highly developed state of the South African economy which belies its status as an emerging market. However, the survey has also brought to the fore a number of puzzling results which may indicate some gaps in the application of finance theory. There is limited use of relatively new developments such as real options, APV, EVA and Monte Carlo simulation. Furthermore, the low target debt-equity ratios reflected the exceptionally low use of debt by South African companies.

Key words

Beta	*DCF*
Capital asset pricing model	*Debt to equity*
Capital budgeting	*Equity market risk premium*
Capital structure	*JSE*
Cost of capital	*Project risk*
Cost of debt	*Risk-free rate*
Cost of equity	*Weighted average cost of capital*

1 Introduction

This paper represents a survey of the practices undertaken by South African listed companies in estimating the cost of capital, the practices relating to capital budgeting as well the capital structure policies adopted by South African companies. The survey is based

on the Graham and Harvey (2001) questionnaire[1] but the authors expanded the survey by requesting detailed information on the estimation of the capital asset pricing model (CAPM) parameters. The results of this survey have been compared to the results of the Graham and Harvey (2001) survey of US companies, prior South African surveys, other surveys as well as to results of the PricewaterhouseCoopers (PWC) valuation survey (2005) undertaken in South Africa.

The results of this survey are generally consistent with finance theory and the results of other surveys, but a few puzzling results and differences remain, which could form the subject for further research.

Whilst there have been a number of surveys of the capital budgeting practices of South African firms, there is limited evidence on the cost of capital practices and capital structure policies of South African firms. This study complements and extends prior surveys of capital budgeting practices and applies the Graham and Harvey (2001) survey with some adjustments to South Africa. Although the determination of a firm's cost of capital is critical in capital budgeting and valuations, there is little empirical evidence of current practices adopted by firms. Furthermore, there is limited evidence on the capital structure policies of South African companies.

The objectives of this study are to determine

□ the current practices employed by South African firms in relation to cost of capital, capital structure and capital budgeting decisions

□ whether current practices reflect financial theory in relation to cost of capital, capital structure and capital budgeting

□ whether relatively new developments in capital budgeting such as real options, adjusted present value (APV), economic value added (EVA)[2], Monte Carlo simulation and modified internal rate of return (MIRR) are being used in practice

□ whether the capital asset pricing model (CAPM) is used to determine the cost of equity

□ whether firms compute a weighted average cost of capital

□ whether the market risk premium is in line with historical estimates and how this survey's average market risk premium compares with the market risk premium indicated by the advisory firms and banks surveyed by PricewaterhouseCoopers

□ whether firms employ a target debt-equity ratio in line with the trade-off theory of capital structure and the extent to which this is applied in practice

This study goes beyond other surveys because of its breadth, in the sense that it examines corporate finance practice relating to cost of capital, capital structure and capital budgeting. Prior surveys generally focused on a single topic such as capital budgeting. Furthermore, there is limited survey evidence relating to cost of capital and capital structure decisions. Also, employing (mostly) the Graham and Harvey (2001) survey questions means that the results are comparable to the results of similar surveys undertaken in the USA and Europe.

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[1] The authors gratefully acknowledge permission granted by John Graham and Campbell Harvey to adapt and use selected questions used in their survey published in the *Journal of Financial Economics* in 2001. Graham and Harvey won the Jensen prize for the best corporate finance paper published in the *Journal of Financial Economics* in 2001.

[2] EVA is a registered trademark of Stern Stewart & Co, New York.

The PricewaterhouseCoopers (2005) survey of valuation methodologies and cost of capital practices is limited to 24 respondents made up of public accounting firms, banks, private equity firms and the corporate finance divisions of Kumba Resources, Sasol and SABMiller. This survey differs from the PWC survey because it is directed at firms listed on the JSE Securities Exchange in 2006. The survey extends the survey conducted by Du Toit and Pienaar (2005), which focused on the capital budgeting practices of firms in 2002.

2   Review of the related literature

One of the pillars of finance theory is that the value of an asset or investment is equal to the discounted present value of its future cash flows. The net present value (NPV) rule states that if the present value of the project's future cash flows exceeds the cost of the project, then the firm should accept the project. If the NPV is negative, the firm should reject the project. The appropriate discount rate should be the opportunity rate of return as measured by the firm's weighted average cost of capital. Whilst financial theory has promoted DCF methods in relation to such naïve methods as payback and accounting rate of return, there may be conflicts between the DCF methods of NPV and the internal rate of return (IRR). Irving Fisher (1930) and Hirschleifer (1958) undertook the seminal work on NPV and IRR. Whilst academics have long promoted the use of NPV, owing to the deficiencies of IRR, until recently, firms have preferred to use IRR as a primary method to evaluate capital projects. Research on capital budgeting increasingly became focused on such topics as capital rationing (see Lorie & Savage 1955) and adjusting for the reinvestment assumption of the IRR. Lin (1976) set out the modified internal rate of return method to overcome the underlying problems of IRR.

Brealey and Myers (200:559) discuss the adjusted present value (APV) concept (where the effects of financial leverage are explicitly analysed) in the context of capital projects, which have important side-effects for other financial decisions of a firm. APV is able to explicitly take into account the value of interest tax shields and the interaction of financing and investment decisions.

Developments in project risk analysis focused on sensitivity and scenario analysis. Hertz (1964) was one of the first to describe the use of Monte Carlo simulation for risk analysis of projects. In the 1990s, Trigeorgis (1993), Dixit and Pindyck (1994) and Ingersoll and Ross (1992) expanded on the advantages of using real option analysis because of the NPV method's inability to capture the value of managerial flexibility. Management may be able to delay, expand, abandon and temporarily close or alter operations during the life of a project. These options have value which so that that a project's value will be equal to its NPV, plus the value of its strategic options.

Brealey and Myers (2000:326) link NPV and capital budgeting to economic value added (EVA) in terms of the latter's use as an incentive tool, the notion being that to increase EVA, managers must increase NPV by investing in the appropriate NPV-maximising projects. Hence whilst EVA is not discussed as being a capital budgeting method as such, EVA can be seen as an extension of the NPV method.

Subject to a number of stringent assumptions, Modigliani and Miller (1958) established that capital structure does not affect firm value. The assumptions are that there are no taxes, there are perfect capital markets and the investment and financing decisions are

independent. However, once these restrictive assumptions are removed, capital structure decisions may affect firm value, and this has led to a number of capital structure theories. Firstly, the trade-off theory of Robichek and Myers (1965), Kraus and Litzenberger (1973) and Kim (1978) predict that companies will maintain a target debt-equity ratio that maximises the value of the firm by balancing the incremental interest tax shields of taking on additional debt with the increased costs of financial distress. Jensen's (1986) free cash flow theory indicates that management will have a tendency to overinvest in poor projects, and the use of debt imposes discipline on management to invest in NPV positive projects only. The pecking order hypothesis (Myers & Majluf, 1984) indicates that firms will first employ retained earnings, then debt, and finally, ordinary equity, and this preference will mean non-adherence to a strict target debt-equity ratio. Information asymmetry and managerial flexibility will mean that firms will prefer to use retained earnings, whilst the use of debt finance may result in restrictive covenants. Since management will be reluctant to issue underpriced ordinary equity, any new issue of ordinary equity may signal that the firm's shares are overpriced.

The evaluation of an investment project requires one to factor risk into the required return. The capital asset pricing model (CAPM) set out by Sharpe (1964) and Lintner (1965) prices only non-diversifiable risk, which is indicated by a firm's beta. CAPM results in a simple formula that management can employ to compute a firm's cost of equity. However, the estimation of the CAPM parameters may be subject to error because of the nature of estimating the risk-free rate, the market risk premium and a firm's beta. Further, Fama and French (1992) reported empirical results that deviate from CAPM.

Dimson, Marsh and Staunton (2003) published global evidence on the historical equity premium over 101 years. Welch (2000) undertook a survey of professional economists on the equity risk premium.

The determination of an optimal capital structure, the after-tax cost of debt and the firm's cost of equity means that a firm can compute a weighted average cost of capital (WACC) which represents a composite required return that management can use to evaluate projects and undertake firm valuations.

Surveys of corporate finance practice have played a vital role in reflecting the adoption of capital budgeting methods, cost of capital practices and the way in which these methods and practices have changed over time. Overseas surveys include that of Gitman and Forrester (1977), which indicated that only 10% of firms used NPV as their primary method, whilst 54% of firms used the IRR as the primary method. Other surveys on capital budgeting include those of Gitman and Mercurio (1982), Block (1997), Graham and Harvey (2001) and Ryan and Ryan (2002). The surveys found a trend towards the use of DCF methods and, the use of NPV over time, in particular. Block (1997) found a preference for payback by small firms.

Graham and Harvey (2001) also surveyed the cost of capital and capital structure decisions of companies. Bruner, Eades, Harris and Higgins (1998) surveyed the cost of capital practices employed by 27 leading US firms.

Lambrechts (1976), and Andrews and Butler (1982) conducted surveys of capital budgeting practice in South Africa. The Parry and Firer (1990) survey focused mainly on risk assessment in project evaluation. Coltman (1995), Gilbert (2003) and Du Toit and Pienaar (2005) conducted further studies on capital budgeting. The results of these surveys generally indicate a trend towards increasing use of DCF methods, particularly in the use of

NPV and a decline in the use of such methods as accounting rate of return. The surveys indicate that the use of the payback method remains high, and Gilbert (2003) found that the use of DCF methods is related to firm size.

Pocock, Correia and Wormald (1991) surveyed firms on the cost of capital practices and found that only 30% of companies employed a weighted average cost of capital. Parry and Firer (1990) found that 35% of companies in their survey used a cost of capital. Alternatives to the WACC included the cost of the specific source of finance for the project and the use of the borrowing rate plus a risk premium. These practices have changed on the basis of the results of this survey.

The valuation and cost of capital survey undertaken by PricewaterhouseCoopers (PWC) in 2005 was limited to 24 respondents from the corporate finance divisions of banks, private equity firms and public accounting firms, as well as three large companies, and includes information about the cost of capital practices adopted by these firms. The results of this survey are compared with the results of the PWC survey, although the populations of respondents differ.

3 Methodology

The survey questionnaire focuses on cost of capital, capital budgeting and capital structure decisions. The authors mailed a questionnaire to each company listed on the JSE Securities Exchange (JSE). There were 32 responses, of which 28 were usable. The response rate on 30 June 2006 was fairly low at 8% overall, but the responses represented 15% of the top 150 companies listed on the JSE Securities Exchange. These responses, many from leading South African companies, provide a good spread across sectors such as mining, banks, retail, industrials, food producers and tourism. The response rate for the Graham and Harvey survey (2001) was 9%. Du Toit and Pienaar (2005) achieved a response rate of 13%, with a smaller survey questionnaire. Surveys can be useful in understanding how current practices differ from financial theory. The results of this study are compared with those of the Graham and Harvey (2001) survey as well as those of the PWC survey (2005), and the similarities in responses offer a further measure of confidence regarding the relevance of the survey results, even though the respondents differ. The number of respondents in the PWC survey amounted to 24 firms. The survey conducted by Bruner *et al.* (1998) on cost of capital practices in the USA consisted of a telephonic survey of 27 publicly listed firms. In line with these surveys, the authors believe that the number of responses in this study is adequate to make reasoned inferences, particularly in relation to the practices undertaken by leading South African companies.

4 Capital budgeting

In this section, the way in which firms evaluate capital projects is analysed. A number of surveys in South Africa (see Du Toit & Pienaar, 2005) have pointed to the growth in the use of discounted cash flow (DCF) methods such as net present value (NPV) and internal rate of return (IRR) methods in preference to such methods as payback and accounting rate of return. This survey went beyond other South African studies by including such methods as economic value added (EVA), adjusted present value (APV) and real options. The results of the survey of capital budgeting methods employed by the responding companies are presented in Figure 1.

NPV and IRR are the primary methods used to evaluate projects, and 82.1% of chief financial officers (CFOs) always or almost always use the NPV method, whilst 78.6% of CFOs always or almost always use IRR. There has been a significant decline in the use of the payback period method and the accounting rate of return. Only 53.6% of CFOs always or almost always use the payback period method to evaluate projects. The use of the accounting rate of return (ARR) is limited, and the reasons for this could be a lack of understanding of how ARR is defined. In contrast to other surveys, the authors included earnings multiples in order to evaluate whether firms avoid the discounting process and use a measure of value that is consistent with the price-earnings approach to value equities. It is also consistent with the payback method, but focuses on accounting earnings arising from the project. Firms may also set a hurdle rate which is used to compare the return from the project. The survey found that 46.4% of CFOs always or almost always use earnings multiples to evaluate projects. This may indicate the use of price-earnings ratios to valuing the shares of firms. Management analyse the increase in expected earnings from the project and multiply this by the firm's P/E ratio to estimate the expected effect of the project on the value of the firm's equity.

The use of EVA to evaluate projects may relate to firms that have adopted EVA as a tool to determine management compensation. It is particularly relevant for the management of firms using EVA to determine the effect of a project on the firm's future EVA.

Figure 1 Percent of CFOs who always or almost always use a stated method
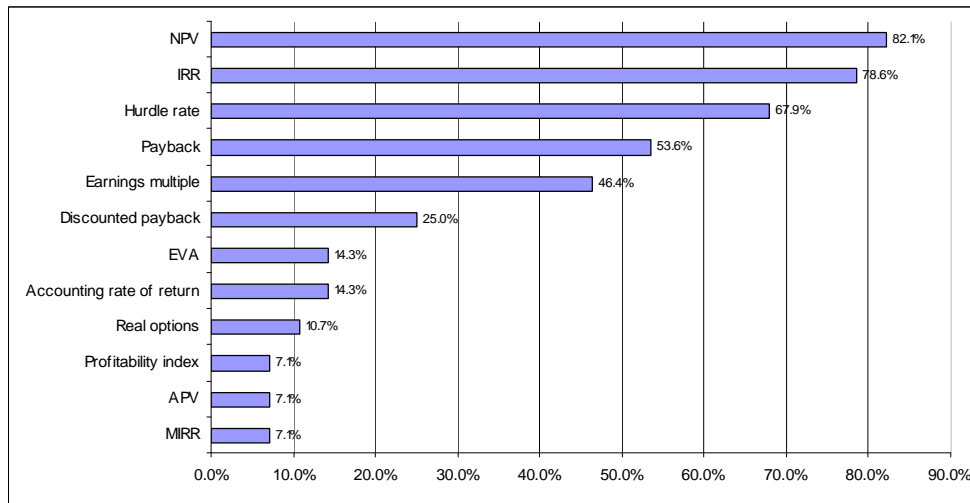
The analysis of embedded real options and project flexibility is recognised in finance as crucial to determining the value of real investments. The use of adjusted present value (APV) may be effective in managing the complexities arising from interaction of the investment and financing decisions. This may apply when there are specific financing options that are dependent on the investment decision or when it is more relevant to value separately the tax shields arising from a project.

The modified internal rate of return (MIRR) makes a specific adjustment to the IRR approach by setting a specific reinvestment rate which addresses a major weakness of the IRR method, namely that the IRR assumes that project cash flows are reinvested at a

project's IRR (see Kellerher & MacCormack 2004). The use of IRR may lead to sub-optimum project rankings. The MIRR requires firms to determine the reinvestment rate which often is set at the cost of capital of the firm. This results in a more realistic project return particularly for high IRR projects. The use of the profitability index (PI) may assist in ranking projects in an environment of capital rationing.

This survey found that very few CFOs use methods such real option analysis, APV, MIRR or the profitability index to always or almost always evaluate projects. The high number (>50%) of CFOs who never use these methods may either indicate a lack of understanding of these relatively new methods or may relate to the complexity of application. Whilst real option analysis may result in complex calculations, the lack of use of the MIRR is more difficult to understand because this method is included as a function in *Excel* and effectively addresses a major flaw in the application of IRR. Perhaps again, it indicates a lack of understanding of the effects of the reinvestment assumption implicit in the use of IRR to rank projects.

CFOs will tend to *always or almost always* use more than one method to evaluate projects – hence the sum of the percentages of methods that are *always or almost always* used in project evaluation will add up to more than 100%. Andrews and Butler (1986) indicated that South African firms employed an average of 2.31 methods, while Coltman (1995) found that South African firms used an average of three methods to evaluate projects.

It is interesting to compare and contrast the results of this survey of practice with other South African and international surveys. The results of this survey are generally consistent with the results of the Graham and Harvey (2001) survey of US companies. Graham and Harvey (2001) found that the IRR and NPV methods are most commonly used to evaluate projects, with about 75% of CFOs always or almost always using the IRR and NPV methods to evaluate projects. Graham and Harvey (2001) found that about 57% of CFOs always or almost always use payback, while close to 39% of CFOs use earnings multiples. The use of real option analysis is significantly greater in the USA compared to this study, with about 27% of CFOs always or almost always using real option analysis to evaluate projects. However, the use of the profitability index and APV in the USA is limited, as in South Africa, with about 11% to 12% of CFOs always or almost always using these methods.

Brounen, De Jong and Koedijk (2004) applied the Graham and Harvey (2001) survey to companies in Europe, specifically, the UK, Germany, France and the Netherlands. Although, there was a small response rate, at 5%, the survey did result in 313 replies across Europe. Surprisingly, greater use is made of the payback method in Europe because CFOs always use or almost always use payback, 69.2%, 64.7%, 50% and 50.9% of the time respectively in the UK, Netherlands, Germany and France. Less use is made of NPV and IRR than in the USA and South Africa, although the study concludes that this is because of the fact that the survey included smaller companies compared with the USA study. Payback is more popular among private and small companies. However, interestingly, CFOs in Germany and France, consider real options to a greater extent when making investment decisions.

In a survey of the Fortune 1000 companies in the USA, Ryan and Ryan (2002) found that the method used *always or often* by US firms was the NPV method followed by the IRR method. The results of the Ryan and Ryan survey (2002) are presented in Figure 2 alongside the results for South Africa for the same methods.

The results of the Ryan and Ryan (2002) survey are generally consistent with the results employed by the responding companies in this survey. Firstly, NPV is preferred to IRR, which is in line with finance theory. Secondly, the payback method is used to almost exactly the same extent in the USA as in South Africa, and the same is true for the accounting rate of return. A greater number of US companies employ the profitability index and EVA, although the use of MIRR is as limited in the USA as it is in South Africa.

**Figure 2   Capital budgeting practices used in the USA (Ryan & Ryan 2002) and South Africa**

Capital budgeting method	USA Always or often used (>=75%)	South Africa Always or almost always
Net present value (NPV)	85%	82%
Internal rate of return (IRR)	77%	79%
Payback	53%	54%
Discounted payback	38%	25%
Economic value added (EVA)	31%	14%
Profitability index	21%	7%
Accounting rate of return	15%	14%
Modified internal rate of return (MIRR)	9%	7%

A comparative analysis of the results of this survey indicates that in most measures, the practices of the South African corporate sector are in line with corporate finance practices in the USA. This reflects the relatively highly developed state of the South African economy, which belies its status as an emerging market.

A survey of capital budgeting practices in South Africa undertaken by Du Toit and Pienaar (2005) indicated that 72% of companies used the NPV and IRR methods to evaluate projects, but that the IRR method was the primary method employed to evaluate investments. Interestingly, however, Du Toit and Pienaar (2005) found that the majority of mining companies use the NPV method as the primary technique to evaluate projects. Payback was used by 41% of companies, while 35.9% of companies determined the accounting rate of return. The use of an accounting measure was higher than in this survey, but this could reflect the use of different terminology. The use of discounted payback was extremely close to the results of this survey.

Only 14% of firms computed the *adjusted internal rate of return,* and Du Toit and Pienaar (2005) expand on the effect of using IRR to rank mutually exclusive projects. This survey supports Du Toit and Pienaar (2005) because not using an adjusted internal rate of return or MIRR by South African firms could result in sub-optimal investment rankings. Correia, Flynn, Uliana and Wormald (2007) refer to a longitudinal study for South Africa from 1972 to 1995, which indicates the trend towards the use of NPV and IRR and a decline in the use of the accounting rate of return.

One would expect firms to assess and adjust for project risk. This survey analysed the use of methods by firms to assess project risk. The results are presented in Figure 3.

Figure 3 Methods used to assess risk
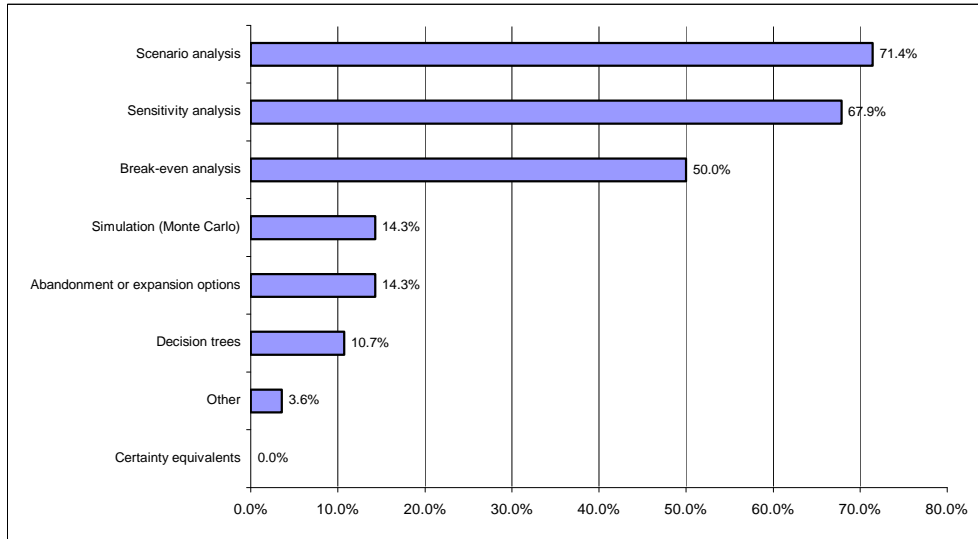
Scenario analysis and sensitivity analysis are most commonly used to evaluate project risk, with about 71% of CFOs *always or almost always* using scenario analysis, whilst 68% of CFOs *always or almost always* use sensitivity analysis to assess project risk. About 50% of CFOs *always or almost always* use break-even analysis.

Methods such as decision tree analysis, Monte Carlo simulation and analysing abandonment and expansion options have become increasingly relevant in finance studies. Monte Carlo simulation is further increasingly used in the valuation of employee share options. All these methods are relevant in the area of real options analysis. However, in capital budgeting, there is limited use of these methods to assess project risk or to identify real options. This supports the prior conclusions regarding the use of real option analysis to evaluate investments.

The zero use of certainty equivalents[3] is interesting as an advantage of this method is that it may address the issue relating to the compounding nature of adding a risk premium to the required return. The assumption that risk is an increasing function of time may have a significant impact on a project's NPV, and this assumption should be evaluated when analysing each project[4].

In the Ryan and Ryan (2002) survey of US companies, it was found that 65% of CFOs *always or almost always* use sensitivity analysis to assess project risk. This is extremely close to the results of this survey for South African firms. In the USA, scenario analysis is used by 42% of CFOs and this compares unfavourably with this survey. This may reflect the increasing use of *Excel,* which has an effective scenario manager function – hence the

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[3] Warren Buffett uses a form of certainty equivalents to evaluate investments because he is extremely conservative about estimating future cash flows but discounts the estimated cash flows at the risk-free rate.

[4] See Correia *et al.* (2007) for an expanded exposition of this issue. See page 10-24.

application of this function in recent years may have made possible the effective use of this method to evaluate project risk which also relates to sensitivity analysis.

Ryan and Ryan (2002) found that only 19% of CFOs always or often used simulation and only 8% of CFOs used decision tree analysis. The use of option pricing models and real option analysis was extremely limited. Parry and Firer (1990) analysed the quantitative methods used by South African companies to assess project risk. They found that 61% of companies used sensitivity analysis, 35% used scenario analysis, only 11% used decision tree analysis and only 7% used Monte Carlo simulation.

Although Parry and Firer's (1990) study is now dated, the use of decision tree analysis has remained constant over time, whilst the use of Monte Carlo simulation (despite the wide availability of Monte Carlo simulation programs and the exponential increase in computing power) has seen an increase in use from 7 to only 14%. However, Pocock, et al. (1991) found that 58% of firms used sensitivity analysis, and the same study found that 15% of firms used simulation. This is closer to the results of this survey.

The issue of adjusting for project risk by analysing which discount rate companies use to evaluate projects will be referred to.

**Figure 4 Discount rate used to evaluate projects**
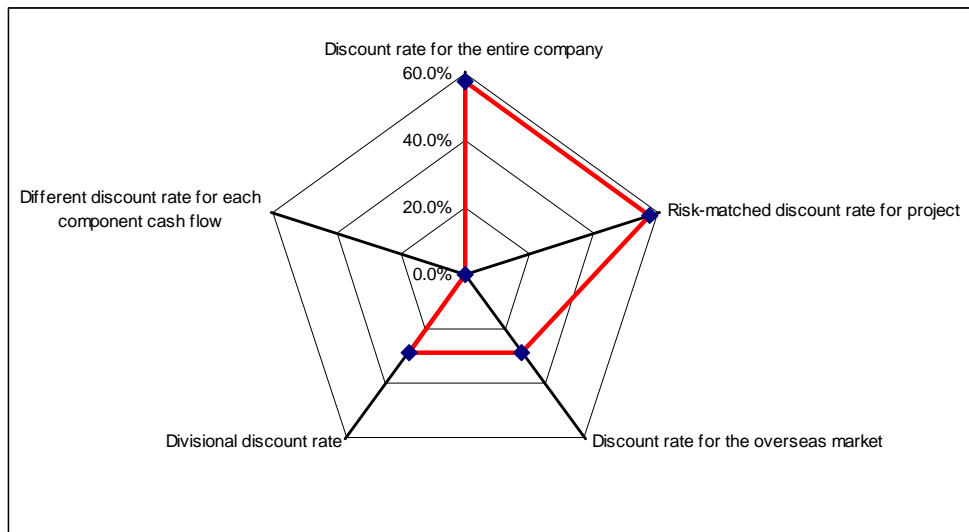
This survey found that 57.1% of CFOs always or almost always use the discount rate for the entire company. However, the same percentage of CFOs always or almost always applies a risk-matched discount rate for a project. The results for this section may make sense in relation to the type of projects that are being evaluated. If a project reflects the firm's average risk, then the discount rate for the entire firm is employed, whilst a risk-matched discount rate for the project is used if the project has a different risk profile to the company. Close to 30% of CFOs use a divisional discount rate and/or the discount rate for an overseas market, but no CFOs employ different discount rates for each component cash flow.

5 Cost of capital

A primary objective of this survey is to explore how firms determine their cost of capital. This survey ascertained whether firms employ the capital asset pricing model (CAPM) to determine the cost of equity. The estimation of the CAPM parameters such as the equity risk premium is evaluated in terms of financial theory and in relation to comparable studies undertaken in South Africa and internationally.

This survey found that 71.4% of companies determine the cost of equity. Although this is surprising, Pocock *et al,* (1991) found that 35% of companies in that survey employed the cost of the specific source of financing to evaluate certain projects. However, there may be valid reasons for this policy. The companies that calculate the cost of equity all use a variant of the CAPM to determine the cost of equity. This means that the CAPM is dominant and the dividend discount model (k=DY + g), the arbitrage pricing theory (APT) model, and the risk-free rate plus a risk premium method are not used at all in practice. The relative weightings attached to the methods used to determine a company's cost of equity are set out in figure 5. This survey, determined rating factors by weighting replies per category to obtain a weighted rating factor for each method.

Figure 5 Cost of equity methods used in practice
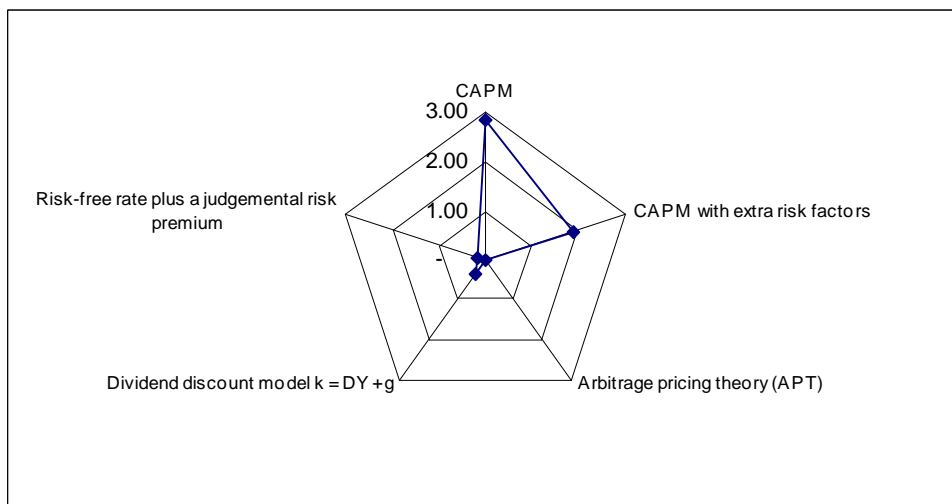
PricewaterhouseCoopers (PWC) undertake a valuation methodology survey every few years in South Africa of about 24 investment banks and corporate finance divisions of firms to determine the valuation methods used in practice. Practitioners often refer to this survey. The PWC survey (2005) indicates that the CAPM is the only method used in practice to determine a firm's cost of equity. The PWC survey results are consistent with the results of this survey.

Graham and Harvey (2001) found that 74% of respondents use the CAPM, while few firms use the dividend discount model. Bruner *et al.* (1998) found that 85% of firms in their survey, which consisted of 27 best-practice firms, use the CAPM or a modified CAPM to determine the cost of equity. Whilst the dominance of the CAPM is real, the application of CAPM may be subject to error and the validity of CAPM itself has been questioned (see

Fama & French 1992). A further possibility is that, over time, the PWC survey may itself be influencing firm behaviour rather than simply reflecting current practice[5].

The current widespread use of CAPM contrasts with the position 15 to 25 years ago. Gitman and Mecurio (1982) found that only 30% of respondents in the USA used the CAPM. In South Africa, Pocock *et al.* (1991) found that 35% of companies used some form of CAPM to determine the cost of equity. As in the USA, the results of this survey, indicate a significant growth in the use of CAPM by South African companies over the last 15 years.

6 Estimation of the CAPM parameters

The CAPM approach states that the company's cost of equity is made up of the risk-free rate plus an equity market premium adjusted by the relative volatility of the company's share price to the underlying market portfolio. More formally:

$$k_r = R_f + \beta(R_m - R_f)$$

where: k_r = cost of equity

R_f = risk-free rate

β = the firm's equity beta

R_m = the return on the market portfolio

6.1 *Risk-free rate*

The estimation of each variable will impact on the firm's cost of equity. How does one measure the risk-free rate? Is it correct to use the yield on short-term government securities such as Treasury bills or should one use the yield on a long-term government bond yield? Whilst some academics advance the use of the short-term yield in order to take cognisance of the assumptions underpinning CAPM, in practice, firms often use the long-term bond yield which is less volatile and results in a closer match with the term of the projects.

McKinsey and Company Inc. (Copeland, Koller & Murrin 2000) promote the use of the 10-year government bond yield. This survey found that 55% of firms used the R153 government bond yield to indicate the risk-free rate, with 15% of firms using the R157. The other 30% of firms used rates such as R186, R194, ALBI, R201 and the average yield.

The 2003 PWC survey found that almost all firms used the R153 bond yield to reflect the risk-free rate, which has a maturity date of August 2010. However, in the 2005 survey, the respondents to the PWC survey were making equal use of the R153 and R157. This reflects the shorter time to maturity of the R153. The R157 has a maturity date of September 2015. In practice, firms are employing the long-term bond yield for use in CAPM. This survey found a greater use of the R153 than in the PWC survey.

It also found that 80% of companies make no adjustment for tax in determining the risk-free rate for use in CAPM. In contrast, the PWC survey (2005) found that 100% of respondents do not adjust the risk-free rate for taxation. This is in line with the standard

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[5] For example, there has been a notable reduction in the distribution of market risk premiums employed by the respondents since the first survey was undertaken in the year 2000. This may be because of access to an increased number of studies of the market risk premium, and the fact that the PWC survey is a significant part of the information set.

form of the CAPM, but it is interesting that in the 2003 PWC survey, it was found that only 76% of respondents did not adjust for tax in determining the risk-free rate. This is more consistent with the results of this survey. Personal tax rates differ and the market risk premium is based on an equity return relative to the nominal pre-tax bond yield.

6.2 *The equity (market) risk premium*

The equity (market) risk premium (R_m – R_f) reflects the additional return that investors require above the risk-free rate for investing in the market portfolio. The financial theory underpinning the determination of the market risk premium is a research area on its own and the market risk premium is dependent on how it is calculated. The use of historical premiums, and whether the arithmetic or geometric mean should be used is relevant, the selection of an appropriate period and the use of surveys of investors and analysts, are all subject to debate and varying interpretation[6]. The role of this survey was to identify the market risk premium used by listed companies on the JSE Securities Exchange. The results are depicted in Figure 6.

Figure 6 The equity (market) risk premium used in practice
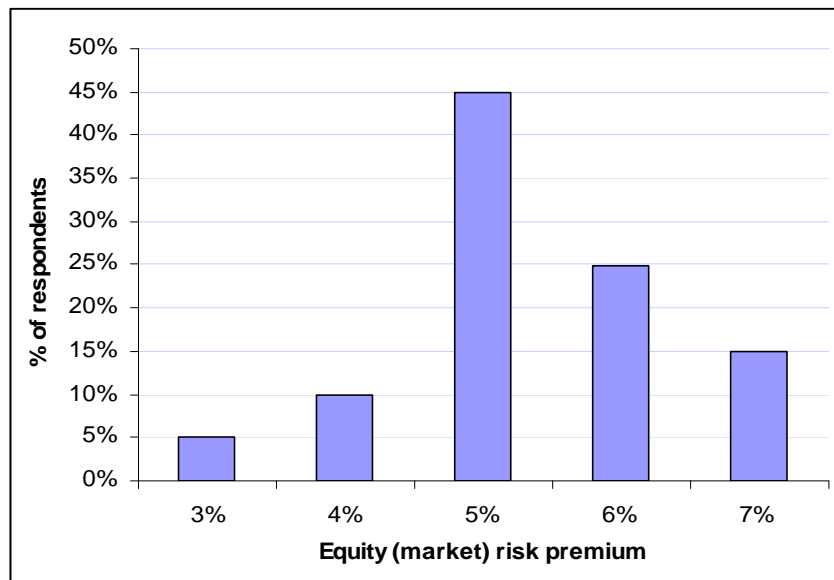
The mean market risk premium is 5.35%, while the median market risk premium is 5%. The results of the PWC survey (2005) are generally consistent with the results of this survey but the respondents used mostly 6% as the market risk premium. PWC found that about 50% of respondents employ a market risk premium of 6%, while about 35% of firms use a market premium of 5% and less than 10% of respondents use a market risk premium of 7%.

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6   See Correia *et al.* (2007) for an explanation of the major issues involved in the determination of the market risk premium. See pages 7-20 to 7-22.

The mean market risk premium indicated by the PWC survey is in the order of 5.6%, which is slightly higher than the results of this survey. Generally, the results of the PWC survey (2005) and the results of this survey are close in terms of determining the market risk premium. PWC has noted a significant narrowing of the range of the market risk premium used by respondents since the first survey was conducted in 2000. According to Kantor (2005), the market risk premium in South Africa is closer to 4%. Kruger (2005) estimates the market risk premium to be from 5 to 5.5%. Dimson *et al.* (2003) determined the historical market premium in South Africa to be 5.2% for the period 1900-2002[7].

6.3 *Betas*

The estimation of a company's equity beta is often based on historical returns, and the period and interval may affect the value of a firm's beta. Further, although the liquidity of the top 40 companies on the JSE Securities Exchange has increased significantly, for the smaller counters there remains a lack of liquidity which will affect the calculation of a firm's true beta.

A number of companies provide beta services. Cadiz/UCT Financial Risk Service makes adjustments for thin trading. Another effect on company betas relates to the weighting of resources in the All Share Index. Resources make up over 40% of the market capitalisation of the JSE Securities Exchange, and since resources companies tend to have higher betas than average, this may dampen the betas of the remaining listed companies. Further, betas have been found to migrate to unity over time.

This survey found that South African companies determine a firm's beta by using a beta service or calculate a beta in-house. The results of the way in which betas are determined are set out in Figure 7. Firms mainly use Cadiz/UCT Financial Risk Service, Bloomberg and McGregor betas for use in CAPM.

Figure 7 The use of beta services

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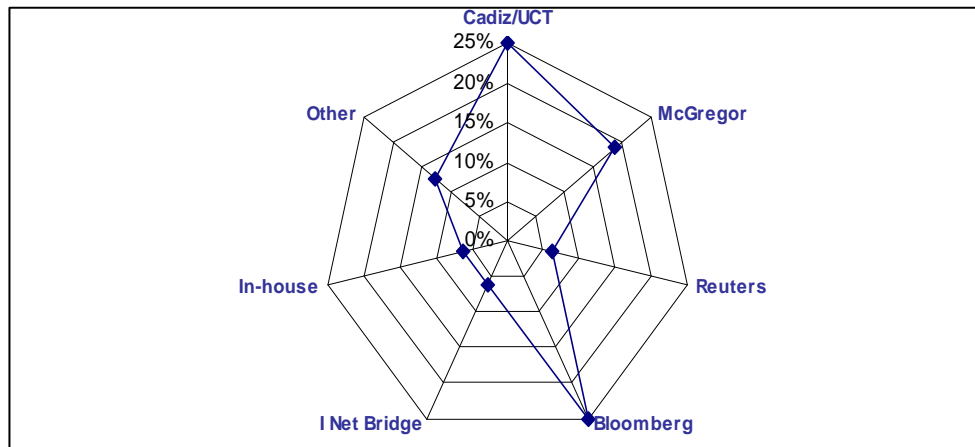
[7] This refers to the geometric mean. The study found that the market premium based on an arithmetic mean was 6.8%. Generally, studies of historical market premiums in the 1990s found risk premiums to be in order of 7 to 10% (see Correia & Uliana 2004 and Firer & McLeod 1999).

The results of the PWC survey (2005) are generally consistent with the results or this survey, with similar use made mainly and equally between Bloomberg and Cadiz/UCT Financial Risk Service, and slightly less use of McGregor. However, the PWC survey found a greater propensity for companies to conduct their own research and calculate betas in-house. Since the respondents in the PWC survey consist mainly of investment banks, corporate finance advisory services and a few major corporates, one would expect this to be the case.

This survey found that 83% of respondents use the company beta, while only 11% of companies use a sectoral beta and only 6% of companies use a project beta. The survey also found that 44% of companies do make adjustments to the published betas, while 56% of companies make no adjustments. In this survey, CFOs were asked whether they ever unlevered and relevered betas. It was found that 68% of companies do not unlever and relever betas, while 32% of companies do. This is in contrast with the PWC survey (2005) which found that 71% of respondents did unlever and relever betas. Unlevering and relevering betas is required when a company invests in a different sector and uses the betas of companies in that sector to determine a relevant beta. Such betas need to be unlevered and relevered in line with the company's capital structure. Also, a company may unlever and relever its beta if it is changing its capital structure. Further, the use of comparable listed firms to determine the beta of an unlisted firm will require the unlevering and relevering of betas.

Because the respondents in the PWC survey are more inclined to be involved in corporate finance advisory services as well as valuations of listed and unlisted companies in different sectors, it is understandable that the PWC survey would indicate a higher positive response in relation to the unlevering and relevering of betas. However, it may also indicate a lack of understanding of the relevance of unlevering and relevering betas by respondents in this survey.

The over-weighting of resources on the JSE Securities Exchange may imply that companies may wish to use the Financial and Industrial Index (FINDI) rather than the All Share Index (ALSI) to determine a company's beta. Cadiz/UCT Financial Risk Service provides betas based on both the ALSI and FINDI. However, the results of this survey indicate that close to 77% of companies use the ALSI index and only 23% use the FINDI index to reflect the market portfolio for the purposes of determining a company's beta.

6.4 *Premium for unique risk*

This survey requested respondents to indicate whether they added a premium for unique risk, being company or project specific risk, to the cost of equity determined using the CAPM. The survey found that 53% of companies do add a specific risk premium to the cost of equity, while 47% of companies do not add a premium. This contrasts with the results of PWC survey, which found that 29% of firms always add a specific risk premium and 54% of firms sometimes add a premium. Only 17% of firms never use a specific risk premium. Again, the higher adjustment for specific risk by respondents to the PWC survey may indicate the fact that these firms may be advising unlisted and smaller firms that have a higher risk profile, and a specific risk adjustment is sometimes made for specific risks. Although adjusting for specific risk is more difficult to justify in terms of finance theory, a shareholder in an unlisted firm will tend not to hold a diversified portfolio, which is a major

tenet of the CAPM. The use of specific risk adjustments may simply reflect an imprecise adjustment for this factor.

7   Capital structure

The determination of a company's weighted average cost of capital requires a firm to determine a relevant capital structure. In terms of the trade-off theory, a firm will have an optimal debt-equity ratio in which it balances the tax advantages of debt financing with the associated costs relating to the increased probability of financial distress.
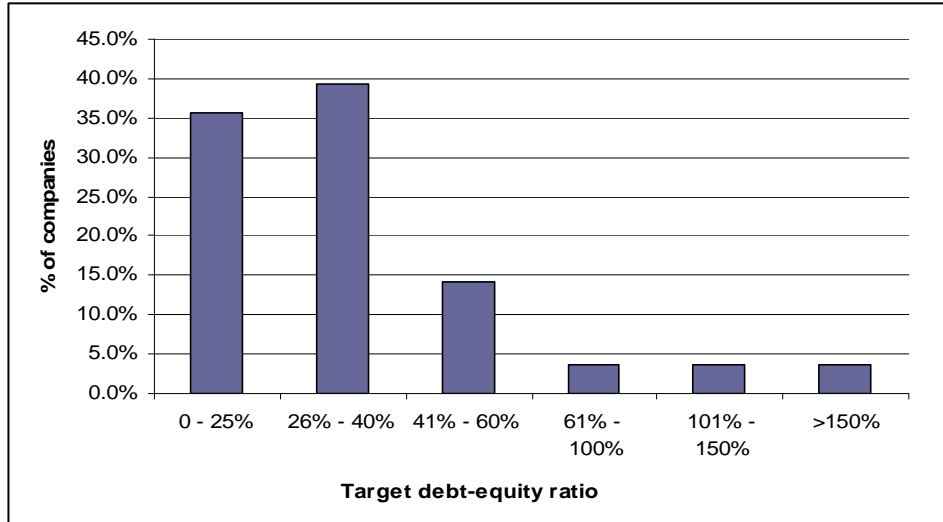
7.1   *Target debt-equity ratio*

The question of whether firms have a target debt-equity ratio is relevant to the discussion on the cost of capital. This survey found that only 21% of the companies did not apply some form of a target debt-equity ratio. The forms of target debt-equity ratios applied are depicted in Figure 8.

Figure 8   The use of a target debt-equity ratio
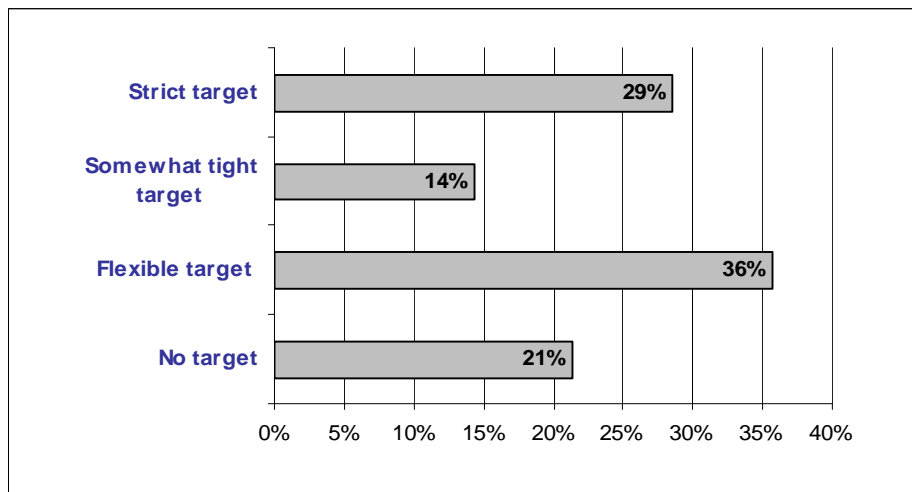
Graham and Harvey (2001) found that 19% of companies did not have a target debt-equity ratio, whilst 37% of companies did have a flexible target debt-equity ratio. These results are extremely close to the results of this survey. However, a significantly greater proportion of South African companies use a strict debt-equity ratio compared with the responding companies in the Graham and Harvey (2001) survey, which found that 34% of companies had a somewhat tight target debt-equity ratio and only 10% of companies had a strict target debt-equity ratio in the USA.

This survey requested information on the target debt-equity ratios selected and the way in which the debt and equity components were valued. The results support the argument that the corporate sector in South Africa is highly under-geared. Firstly, firms were requested to indicate the target debt-equity ratios; the results are indicated in Figure 9.

Figure 9 The use of a target debt-equity ratio

The target debt-equity ratios appear to be low in relation to what is predicted by the trade-off theory of capital structure. The reason why most South African companies are under-geared may relate to high profitability levels in the domestic economy, but limited growth prospects for expansion, as well as an unwillingness or inability to expand into offshore markets. The increasing consolidation in many sectors may support such an argument.

Further, for many years, high real interest rates may have affected management's perspectives on the advisability of the use of debt[8]. Increasing activity by private equity funds to acquire listed companies and to restructure balance sheets by taking on significant amounts of debt further supports the argument that companies in South African are currently under-geared[9].

7.2 *Weighted average cost of capital*

In terms of determining the weighted average cost of capital (WACC), this survey found that 65% of companies always or almost always use the target debt-equity ratio, while 35% of companies use the current debt-equity ratio. If one acknowledges the contemporary approach to capital structure (see Myers 1983) and accepts that there is an optimal debt-equity ratio, and ignores the strict Miller-Modigliani (MM) propositions (see Miller & Modigliani 1958), then the selection of a target debt-equity ratio that is too low will result an increased cost of capital. Again, this view may be aligned to increased private equity activity in the South African corporate sector.

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[8]   In 1998, short-term interest rates did increase to 24% per year thereby placing significant liquidity and cash flow pressures on many companies. Companies were further affected by the effect of such high interest rates on domestic consumer demand.

[9]   A study by Ryan van Breda (2007) to measure the default probabilities of the top 42 non-financial South African firms found that with the exception of two companies, the default probabilities of the remaining companies were extremely low. Recently, the sub-prime crisis has had a negative effect on private equity financing and the use of high levels of leverage to buy out listed firms.

7.3 *Cost of debt*

Companies should use the incremental after-tax cost of debt to determine the WACC. This survey found that 68% of respondents use the historical average after-tax interest rate, while 32% of companies use the incremental/marginal after-tax rate. This is puzzling and unexpected, and contradicts financial theory unless the historical rate is similar to the current interest rate. Whilst one can understand the possible sustainability of historical *spreads*, the movement in interest rates implies that close to two-thirds of companies may be using an incorrect measure for determining the cost of debt.

8   Valuation methods used by companies

In response to a question on the valuation methods used by South African companies, the survey found that the 67.9% of companies *always or almost always* use the free cash flow (DCF to the firm) method to value the equity of firms. This indicates a significant trend towards the use of free cash flow for valuing firms. However, most firms use price-earnings (P/E) multiples to value companies, and this may often be used as a relatively simple and quick measure of value. The use of P/E multiples may only be used to support a free cash flow valuation or act as a reasonability test, but further research needs to be conducted in this area. The methods used in practice are provided in Figure 10.

Figure 10   Valuation methods used to value the equity of companies
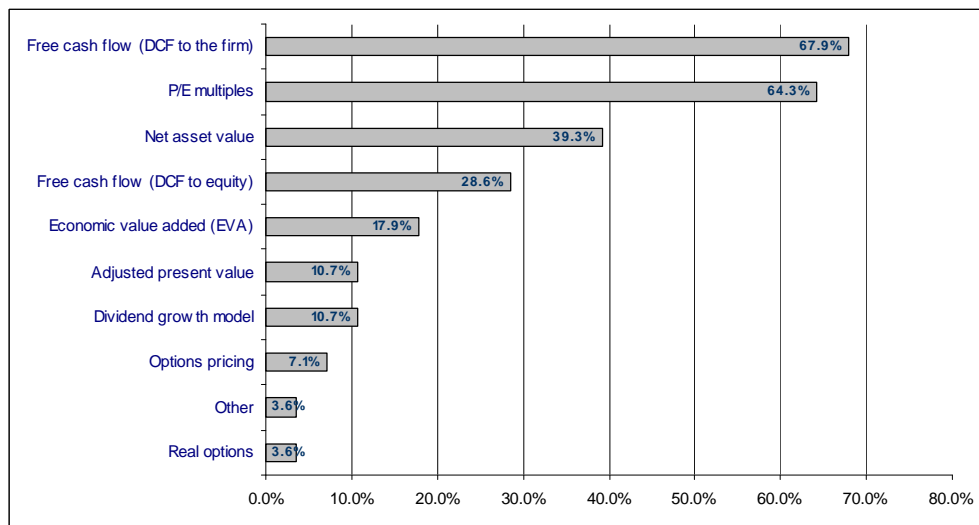
The results of this survey are generally consistent with the results of the PWC survey (2005). Most of the respondents in the PWC survey used discounted cash flow (free cash flow), followed by the price-earnings ratio and then net asset value. However, this survey found that there were a greater number of respondents using EVA. This is consistent with the fact that the PWC survey reflected mainly investment banks and advisory services which use EVA to a lesser extent than the listed companies included in this survey.

9 Conclusion

This survey offers insights into the practice of corporate finance in South Africa. The results of the survey are mostly in line with financial theory and are generally consistent with other studies. However, the survey has also brought to the fore some puzzling results. Firstly, although firms mainly apply DCF capital budgeting methods, there has been a reluctance by South African firms to follow relatively new developments in capital budgeting and use such methods as real option analysis, APV and Monte Carlo simulation. Secondly, the use of IRR for ranking projects may be problematic, and owing to the effects of the re-investment assumption, the promised IRR may differ markedly from the realised IRR. However, firms have not adopted the MIRR method to evaluate projects, which effectively deals with this problem of using IRR to evaluate projects. Thirdly, a relatively large number of firms employ historical interest rates to determine the cost of debt. This may indicate some gaps in the application of finance theory. The corporate finance practices of firms may reflect the increased emphasis on the NPV and IRR capital budgeting methods as well as CAPM but firms have been slow to adopt new methods such as real option analysis.

The use of CAPM is dominant in the determination of the cost of equity. The estimation of the CAPM parameters is generally consistent with financial theory and the results of the PWC survey (2005). Most companies use some form of a target debt-equity ratio, which is consistent with the trade-off theory of capital structure. However, in a further puzzle, it may be argued that debt-equity ratios remain too low in the South African corporate sector.

This study found that CFOs in South Africa mostly adhere to practices that are consistent with finance theory, and this reflects a highly developed corporate sector whose practices are comparable with those in the USA. However, further research is required to investigate the determinants of capital structure in South Africa and to determine the reasons for the low debt-equity ratios of South African companies. Also, further research is required to understand the reluctance of companies to adopt new methods such as real option analysis.

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