

*Full Length Research Paper*

# The application of the Capital Asset Pricing Model (CAPM): A South African perspective

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**The focus of this paper is the capital asset pricing model (CAPM), with a specific emphasis on two of its main components, namely the risk-free rate and beta. The CAPM is used extensively in practice to calculate the cost of equity, which, in turn, is used to calculate the weighted average cost of capital for equity valuation and investment appraisal purposes. The aim of this paper is to investigate how well valuation theory regarding the CAPM in particular, as advocated by academia, is aligned with the CAPM and alternative models that leading financial analysts and corporate financiers apply in practice. No study has yet compared the methods of choice of investment practitioners when calculating the cost of equity to that of academia. The research results revealed that, although both academia and investment practitioners favor the CAPM, they disagree significantly with regard to the components of the CAPM and the use of alternative models.**

**Key words:** Academia, investment practitioners, capital asset pricing model, discount rate, arbitrage pricing theory, risk-free rate, beta.

## INTRODUCTION

Several researchers have indicated that the discounted cash flow (DCF) approach is the most accurate and flexible equity valuation method (Goedhart et al., 2005; Courteau, Kao et al., 2003; Berkman et al., 2000). Central to the application of a DCF approach is the calculation of an appropriate required rate of return or discount rate (Damodaran, 2007), which is typically the weighted average cost of capital (WACC). The WACC is calculated by allocating weights to the costs of the various components (interest-bearing debt, preference shares and ordinary share equity) in a company's target capital structure (PricewaterhouseCoopers, (PwC) 2008).

Internationally, the two primary models that are applied in practice to calculate the cost of equity are the capital

asset pricing model (CAPM) and the arbitrage pricing theory (APT) model (PwC, 2008). Leading financial analysts and corporate financiers, who will be referred to as "investment practitioners" in this paper, tend to focus on the CAPM in practice (PwC, 2008). Academically, the South African Institute of Chartered Accountants (SAICA, 2008) highlights the CAPM as a key approach in the calculation of the cost of equity, which, in turn, is used to calculate the WACC for equity valuation and investment appraisal purposes.

Much research has been devoted to determining which models are superior in calculating the cost of equity (Ammann and Verhofen, 2007; Burton, 1998; Magni, 2005; Magni, 2007; Bello 2008). Although researchers generally agree that the use of the CAPM is a key application area of finance for investment decisions and equity valuations (Magni, 2005; Damodaran, 2007; Fernández, 2002), they seem to be torn between the relative merits of the CAPM and the APT model. Those in favor of the APT model refer to the stringent assumptions of the CAPM and the fact that it cannot be tested empirically (Nawalkha, 2007; Fama and French, 2004; Roll, 1977). Others argue that the CAPM has undoubtedly made a

**Abbreviations:** APT, Arbitrage pricing theory; CAPM, capital asset pricing model; DCF, discounted cash flow; R(e), expected return; R<sub>f</sub>, risk-free rate; β, beta; COV, covariance; NA, not applicable; NI, not included; PwC, PricewaterhouseCoopers; E(R<sub>i</sub>), expected return on asset i; E(R<sub>m</sub>), expected return on the market; SAICA, South African Institute of Chartered Accountants; WACC, weighted average cost of capital; σ<sup>2</sup>, variance.

undoubtedly made a fundamental contribution to the understanding of asset pricing (Perold, 2009; Fernández, 2002; Harrington and Korajczyk, 1993).

However, the literature review revealed no evidence of a study that compared academia's preferences with regard to the use of specific approaches to the calculation of the cost of equity, with that of investment practitioners. This study investigates academic consensus among chartered accountants regarding the use of the CAPM, and its constituents in particular, and whether the general concern regarding a gap between theory and practice (Triantis, 2005; Ralston 2003; Bernstein 2008) is warranted. Although this exploratory study focuses on a specific target audience within the wider academic community, the research results indicate that the topic warrants further investigation, which the author intends pursuing with future research. However, for the purpose of this paper, the reference to academia will specifically refer to chartered accountants who are in academia. The emphasis is on academia's perception regarding the calculation of the cost of equity with a specific focus on the CAPM, and how these preferences compare to those of investment practitioners in South Africa. The next two sections set out the objective and the value of the research, followed by a literature review. Sections five and six describe the research methodology and the survey results regarding the CAPM, as preferred by academia, followed by a gap analysis between theory and practice in section seven. Final remarks are offered in the last section of this paper.

### Objective of the research

The chief objective of this research is to ascertain whether there is a gap between what is lectured in academia and what is applied in practice. If such a gap exists, it may have implications for academia and investment practitioners. The paper will focus on the calculation of the cost of equity with a specific emphasis on the CAPM. The research forms part of a wider research project, which is aimed at establishing the nature and size of the gap between theory and practice with regard to equity valuations, that is primary methods of equity valuation, secondary methods of equity valuation, discount rates, etc.

### Value of the research

Although the convergence of academia and investment practitioners on mainstream valuation practices is a common phenomenon in developed markets (Bruner, Conroy, Estrada et al., 2002), no research has yet been conducted on this topic in South Africa. A PwC valuation methodology field survey, which was conducted among leading financial analysts and corporate financiers in 2008, provides a valuable benchmark for best practice for

investment practitioners. Although the PwC survey afforded academia an insight into the nature and frequency of the application of equity valuation methods in practice, no such research has yet been conducted among academia.

The contribution of this study is that it facilitates the convergence of, firstly, academic thinking regarding the use of the CAPM, and, secondly, valuation practices between academia and investment practitioners. To this end, the research results will present academic consensus regarding the use of the CAPM and highlight differences between academia and investment practitioners in this regard. Should the results reveal that there are approaches to the calculation of the cost of equity, and the use of the CAPM in particular, that are used frequently in practice which are not advocated by academia, this may highlight the need for academia to reconsider their syllabus. Similarly, it could mean that there are approaches to the calculation of the cost of equity and the use of the CAPM that are advocated by academia that are not applied in practice. In this case it may be necessary for investment practitioners to reconsider their approach to the CAPM and other methods that they use in practice.

The research also contributes to the preparation of students for the marketplace. If there is a gap between theory and practice, the nature of the gap should be investigated and resolved in order to better align academia with the real world. It is therefore, imperative that academic consensus regarding the calculation of the cost of equity, and the application of the CAPM in particular, is compared to the current application of the CAPM in practice, to establish whether such a gap exists.

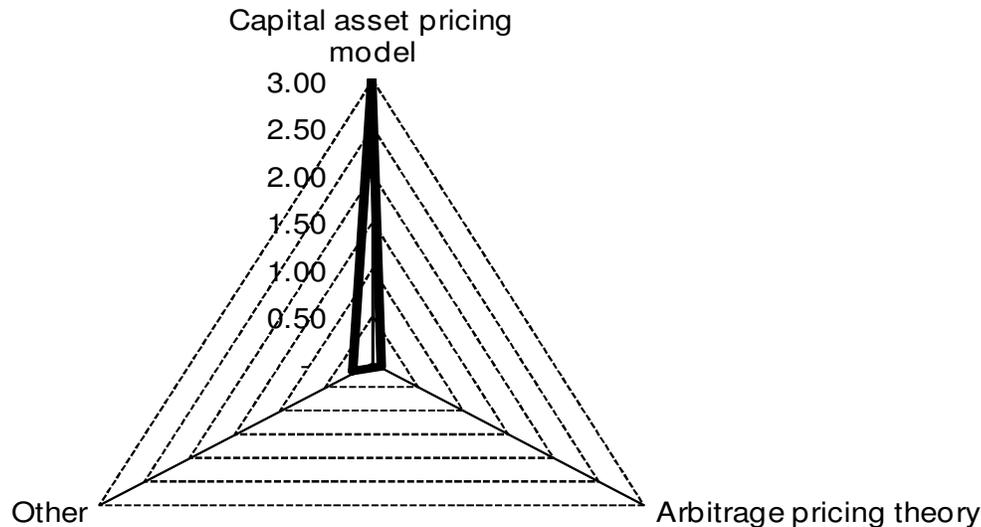
### LITERATURE REVIEW

Modern finance theory revolves around maximizing an investor's return at a given level of risk (Mirza, 2005). Based on Fama's (1970) work regarding the efficiency market hypothesis and Markowitz and Tobin's portfolio theory, the CAPM was developed in the mid 1960s, in order to express the relationship between an asset's risk and return (Sharpe, 1964; Lintner, 1965; Mossin, 1966).

The underlying principle in the CAPM is that company or industry-specific events have very little impact on an asset's required return. The relevant risk is the market risk, which refers to the sensitivity of the asset's returns to the returns of the market as a whole, which is reflected in beta (Mirza, 2005). The classical Sharpe-Lintner CAPM equates an asset's expected return to three variables, namely beta ( $\beta$ ), the risk-free rate ( $R_f$ ) and the expected market return ( $R_m$ ) (Fama and French, 2004), so that:

$$E(R_i) = R_f + \beta_i [E(R_m) - R_f],$$

where



**Figure 1.** Methods used most frequently to calculate the cost of equity in practice in South Africa. Source: Adapted from PwC (2008)

$E(R_i)$  = expected return on asset  $i$ ,  $R_f$  = risk-free rate,  $B_i$  = beta of asset  $i$ ,  $E(R_m)$  = expected return on the market. Mathematically, beta is the covariance of asset returns and market returns divided by the variance of market returns, so that

$$\beta_i = \frac{\text{cov}(R_i, R_m)}{\sigma^2(R_m)}$$

where;  $B_i$  = beta (systematic risk) of asset  $i$ ,  $\text{cov}(R_i, R_m)$  = the covariance between asset  $i$  and the market,  $\sigma^2(R_m)$  = the variance of the market returns (Fama and French, 2004).

Internationally, academia and investment practitioners have been debating the merits of the CAPM since its inception in the mid-1960s. The CAPM is prone to criticism since it operates in a *ceteris paribus* environment and is based on various assumptions, including the existence of a risk-free asset which enables investors to borrow unlimited amounts at a constant rate. Similarly, the beta factor, particularly its appropriateness as a measure of risk, has been the subject of various empirical studies. Research results by Blume (1971), Baesel (1974) and Roenfeldt (1978), for example, indicated that share betas are unstable over time, while research by Fama and French (1996), Jegadeesh (1992) indicated that beta is not statistically related to returns. Since research indicates that the third component of the CAPM, namely  $R_m$ , cannot be tested empirically (Fama and French, 2004; Harrington and Korajczyk, 1993; Mirza, 2005) the focus of this paper is on  $\beta$  and  $R_f$ .

Ross (1976) introduced an alternative approach to asset-pricing theory in the form of a multifactor model known as arbitrage pricing theory (APT) in the late 1970s.

The APT model equated the expected return of an asset to various macro-economic factors, each with a specific beta factor, so that

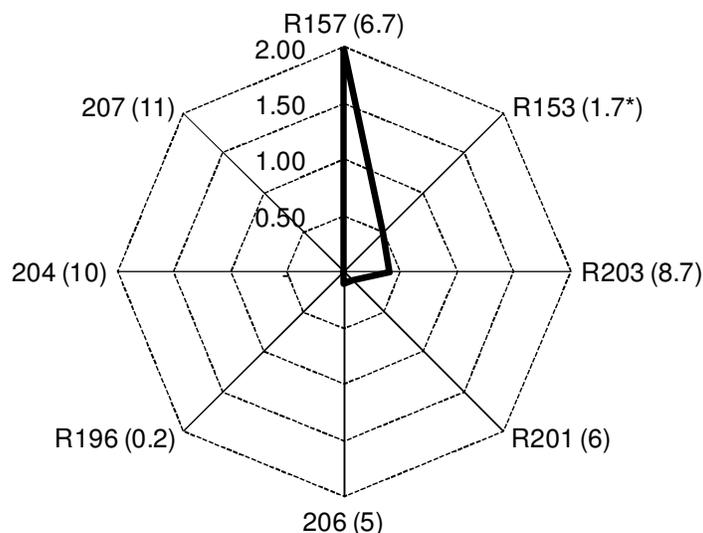
$$E(R_e) = R_f + \beta_1 P_1 + \beta_2 P_2 + \dots,$$

where,  $E(R_e)$  = expected return on equity capital,  $R_f$  = risk-free rate,  $\beta P$  = risk premium reflecting sensitivity to changes in a specific risk (PwC, 2008).

### Methods that are used to estimate the cost of equity in practice in South Africa

A valuation methodology survey conducted by PwC in 2008 among 25 leading financial analysts and corporate financiers, confirmed that investment practitioners have a preference for the CAPM when calculating the cost of equity. The 2008 PwC survey used a frequency table between 0-3, where 0 indicates that the method is seldom or never used, 1 indicates that the method is often used, 2 indicates the method is frequently used and 3 indicates that the method is always used. The most popular methods that are currently used to calculate the cost of equity in practice, according to the PwC survey, are presented in Figure 1.

Figure 1 indicates that the most popular method to calculate the cost of equity that is currently used in practice is the CAPM, which scored a 3.00. Other methods (scored a 0.2) and the APT model (scored a 0.10), were second and third best alternatives; and as their frequency scores indicate, negligible, according to the PwC survey. Methods that were mentioned under the "Other" category were peer composites and the build-up



**Figure 2.** Proxies that are used for the Rf in practice in South Africa.  
 \*The numbers in parenthesis indicates the bonds' term to maturity.  
 Source: Adapted from PwC (2008)

method.

### Proxies for the risk-free rate that are used in practice in South Africa

One of the key components of the CAPM is the risk-free rate (Rf). Although various proxies can be used for Rf, the results of the PwC survey (2008) indicated that the majority of the respondents favored the R157 government bond. The most popular benchmarks that were used at the time of the survey for the Rf in practice, according to the PwC survey, are presented in Figure 2.

From Figure 2 it is evident that the majority of investment practitioners use the R157, which scored a 2.00. The use of the other bonds, for example, the now defunct R153 bond (scored a 0.5) and the R203 bond (scored a 0.4), seemed negligible. The preference for the R157 bond *vis-à-vis* the R153 bond is understandable, given the former's longer term to maturity. Respondents were also asked whether they adjust the Rf for tax purposes. The majority (96%) indicated that they do not adjust the Rf for tax purposes.

### The use of beta in practice in South Africa

Another key component of the CAPM is beta. The investment practitioners indicated that they consider a variety of sources for determining beta. The most popular service providers that are used by investment practitioners are Bloomberg (scored a 1.3), the UCT Financial Risk Service (scored a 1.1) and McGregor BFA (scored a 1.0).

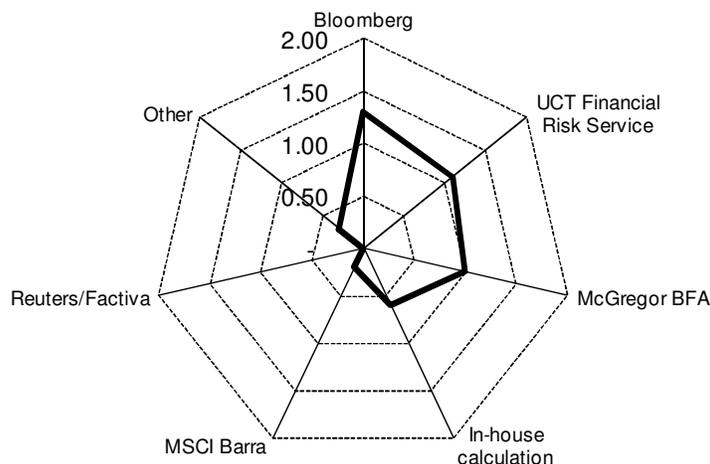
The PwC survey also requested respondents to indicate whether they use historical or forecast betas. The majority (96%) of the respondents indicated that they use historical betas, while only 4% indicated that they use forecast betas. The question is: To what extent do the preferences of investment practitioners agree with that of academia? Although no recent literature was found that focused on such a gap, concern regarding the existence of such a gap is not a new phenomenon.

### Gap analysis

The first formally reported study that investigated a gap that presumably exists between theory and practice with regard to investment management, was conducted by the American Finance Association (Upton, 1949) in 1948. The American Finance Association held a convention at Cleveland in the United States, where 27 lecturers representing 20 schools, met to discuss methods of teaching Business Finance. The main conclusion reached by the members present at the convention was that business school education failed to meet the needs of businesses in practice.

Approximately 15 years later, Wendt (1966) conducted a survey at 205 business schools and found that investment faculties lagged investment practitioners by more than a decade and concluded that there was a need for academia to catch up.

In a later study Smith and Goudzwaard (1970) found that the gap between theory and practice does not only exist, but is also widening. More recently, in a study regarding equity valuations, Nel (2010, 2009) concluded that, although similarities exist, academia and investment



**Figure 3.** Source of information for beta in practice in South Africa  
Source: Adapted from PwC (2008)

practitioners differ significantly in their respective approaches to equity valuation methods and multiples, in particular. However, the literature review revealed no research on how well the theory of the CAPM, as advocated by academia, is aligned with the CAPM as it is applied in practice. To the best of the author's knowledge, no gap analysis has yet been conducted on the calculation of the cost of equity and the specific application of the CAPM.

## RESEARCH METHODOLOGY

In order to achieve the objective of the research, a two-pronged approach was adopted:

- (1) Establish academic consensus regarding the methods of choice when calculating the cost of equity and the theory of the CAPM in particular;
- (2) Establish how the methods of choice and the theory of the CAPM that were identified in (1) compare with the methods of choice and the CAPM that investment practitioners apply in practice.

In order to ascertain academic consensus regarding the calculation of the cost of equity and the use of the CAPM, a survey was conducted in 2008 at 12 universities in South Africa. The PwC survey will serve as a reflection of the preferences of investment practitioners in the marketplace.

### Survey design and distribution

A draft survey was prepared and a link to an electronic database was emailed to five lecturers. Their feedback and recommendations were incorporated in the questionnaire and the database was cleared of these pilot responses.

The final survey presented 25 questions and took approximately 15 minutes to complete.

SAICA emailed a link to the final, electronic, web-based questionnaire to chartered accountants who work in academia. An email reminder was sent out and responses were subsequently followed up telephonically.

### Response rate

The questionnaire was sent to 446 chartered accountants who are in academia. Of these emails, 36 were returned to the sender as a result of invalid addresses. A potential target audience of 81 lecturers opened the email. This percentage may seem small at first glance, but it is important to bear in mind that not all lecturers in academia lecture finance. Only 54 lecturers currently lecture, or have in the past lectured, finance, as confirmed by the relevant divisions at the respective universities. The effective target audience at the universities therefore only consisted of 54 lecturers. A total of 35 lecturers of the potential 54 respondents completed the questionnaire. All completed questionnaires were usable, constituting an effective response rate of 65%. Although in terms of absolute numbers 35 responses may seem small, it should be kept in mind that similar research conducted by PwC in 2008 yielded only 25 responses (PwC, 2008). The 35 responses originated from ten universities, which render them representative of the general thinking in academia regarding the topic of equity valuations. The fact that SAICA supported the research initiative decreases the likelihood that a higher number of responses would have been achieved in any other cost-effective way. The profile of the lecturers who participated in terms of qualifications and finance-specific lecturing, renders the results useful.

### Profile of participants

The participants in the academic survey were suitably qualified lecturers with ample lecturing experience on the topics of equity valuations and investment appraisals. All the participants were members of SAICA. In addition, 80% of the participants held masters degrees, of whom 20% also held PhDs.

These participants represented ten of the universities in South Africa, indicating that the results are a fair reflection of general academic thinking regarding valuations. One can therefore conclude that the participants in the survey constituted a strong academic knowledge base to respond to the questions regarding equity valuations.

### Survey questions

The academic survey was divided into three sections. The first

section dealt with specific equity valuation methods, such as the free cash flow model and multiples. Section two focused on the discount rate, posing questions regarding the most appropriate method for calculating the cost of equity and specific questions regarding the CAPM. The third section covered the profile of the participants. This paper will focus on the second and third sections of the questionnaire, while the remaining section will form part of further research. It is important to bear in mind that the results are merely a reflection of the beliefs and opinions of chartered accountants in academia.

The emphasis of this paper falls on seven questions in the survey that were designed to establish how the cost of equity should be calculated, in accordance with academic thinking, with a specific emphasis on the CAPM. The questions focused on the following:

- (1) How frequently various methods should be used to calculate the required rate of return;
- (2) How frequently various proxies for the risk-free rate should be used when employing the CAPM;
- (3) Reasons for the choice in (2);
- (4) Whether the risk-free rate should be adjusted for tax purposes;
- (5) Which tax rate should be used to adjust the risk-free rate;
- (6) How beta should be determined;
- (7) How the CAPM should be approached when an entity has a negative beta.

Questions 1 and 2 required respondents to indicate how frequently the respective methods/risk-free rates should be used on a scale of 0 - 4, where 0 indicates that the method is never used, 1 indicates that the method is almost never used, 2 indicates the method is sometimes used, 3 indicates that the method is almost always used, and 4 indicates that the method is always used. The survey results for questions 1 and 2 discussed in this paper reflect those alternatives that respondents indicated should always or almost always be used in practice, in other words the percentage of respondents who answered 3 or 4. Question 4 was a Yes/No type question. Questions 3, 5, 6 and 7 were alternative/open ended type questions where respondents could choose between alternative responses or specify an alternative that was not listed.

## RESULTS

Although the literature review highlighted several shortcomings of the CAPM (Nawalkha, 2007; Fama and French, 2004; Roll, 1977), it is used extensively in practice. According to the PwC survey, investment practitioners predominantly use the CAPM, with little regard for the APT model. In order to determine how well these preferences are aligned with those of lecturers in academia, it is necessary to ascertain academic consensus regarding the use of the CAPM and alternative models.

### Methods used to determine the required rate of return

The first question required respondents to indicate which methods should be applied most frequently in practice to determine the required rate of return when valuing an interest in an entity. The methods that should be applied most frequently to determine the required rate of return in practice when valuing an interest in an entity's equity, according to academic thinking, are presented in Figure 4.

As Figure 4 illustrates, the respondents had a clear preference for the CAPM adjusted for additional risk factors (78%), and the CAPM (70%). The build-up method, which garnered 58% support, was the third most popular alternative.

Considering whatever investors required (26%) garnered little support from respondents. Only 8% of the respondents were of the opinion that the average historical return on equity should be used, while 7% regarded backing out of the dividend/earnings model or listed entities ("Other"), as suitable alternatives to calculate the required rate of return.

### Proxies used for the risk-free rate when employing the CAPM

The second question required respondents to indicate which instruments should be applied most frequently in practice as proxies for the  $R_f$  in the CAPM. The proxies for the  $R_f$  that, according to academic thinking, should be applied most frequently when using the CAPM in practice to value an interest in an entity's equity are presented in Figure 5.

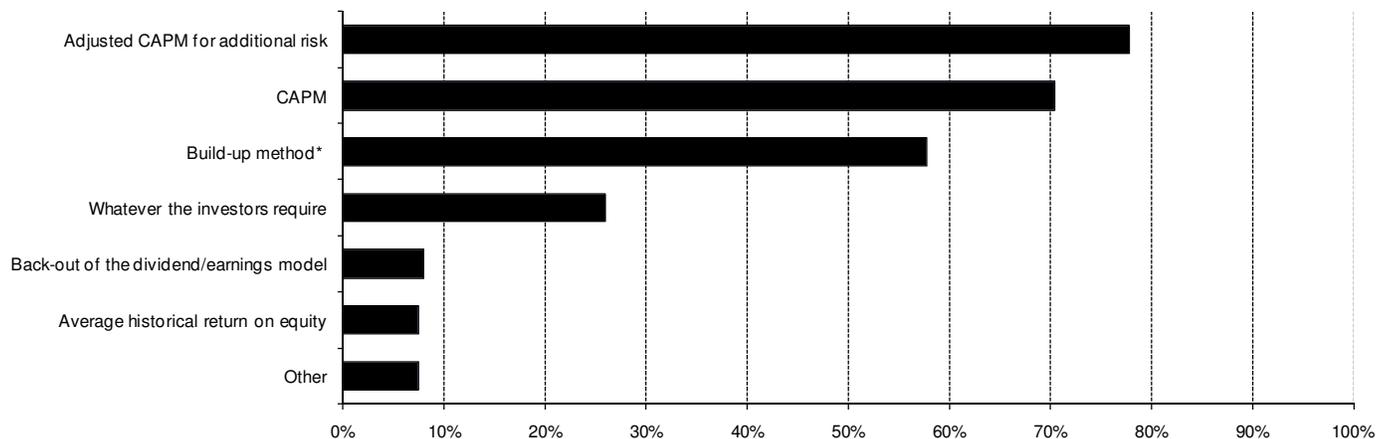
As is evident from Figure 5, the majority of academia favors the R153 bond (now defunct), followed by the R157 and the R186 bonds. The preference for the R153 bond, *vis-à-vis* the R157 and the R186 bond is a strange phenomenon, since at the time of the survey, the R153 had a very short term to maturity (1.7 years). The close proximity between the preference for the R186 and R196 bonds also seems illogical. Surely, a bond's term to maturity should match that of the investment. The use of the other bonds is negligible.

The third question required respondents to provide reasons for their selection of proxies for the risk-free rate. The main reason presented for the choice of the specific bonds was that they were the benchmark government bonds (41%), followed by the fact that they offered good liquidity (18%) and that they gauged the domestic market well (16%).

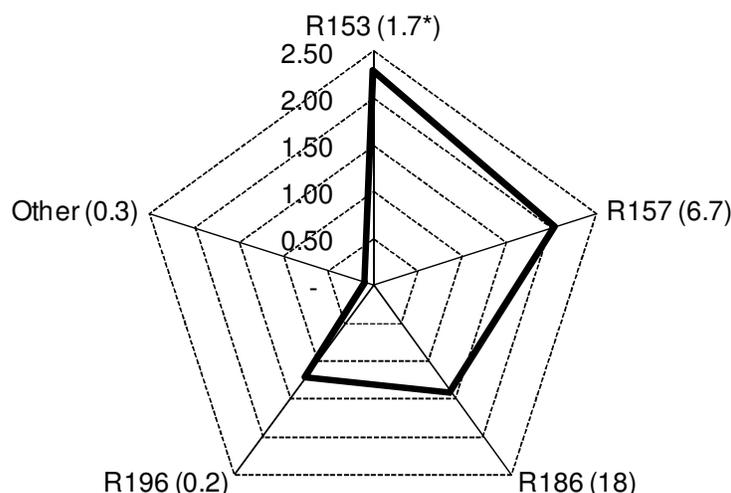
Alarming, only 6% of the respondents correctly indicated that the appropriate bonds should be chosen based on the match between their term to maturity and the tenure of the particular investment. Few (3%) respondents regarded high trading volumes as an appropriate reason for choosing specific bonds.

The fourth question required respondents to indicate whether they adjusted the  $R_f$  for tax purposes and, if so, the fifth question required them to indicate at what tax rate.

The majority (64%) of respondents were in favor of adjusting the  $R_f$  for tax purposes, while 36% was opposed to it. Of the respondents in favor of a tax adjustment, 38% preferred a corporate tax rate adjustment (currently 28%), 32% an adjustment at the top marginal rate for individuals (40%), and 29% the corporate tax rate plus a dividends tax (34.5%).



**Figure 4.** Methods that, according to academia, should be used most frequently to determine the required rate of return when valuing an interest in an entity's equity.



**Figure 5.** Instruments that, according to academia, should be used most frequently as proxies for risk-free rates when employing the CAPM in practice.\*The numbers in parenthesis indicates the bonds' term to maturity.

### Calculating beta when employing the CAPM

The sixth question required respondents to indicate how beta should be calculated when using the CAPM. The sources of information for the calculation of beta that, according to academic thinking, should be used most frequently are presented in Figure 6.

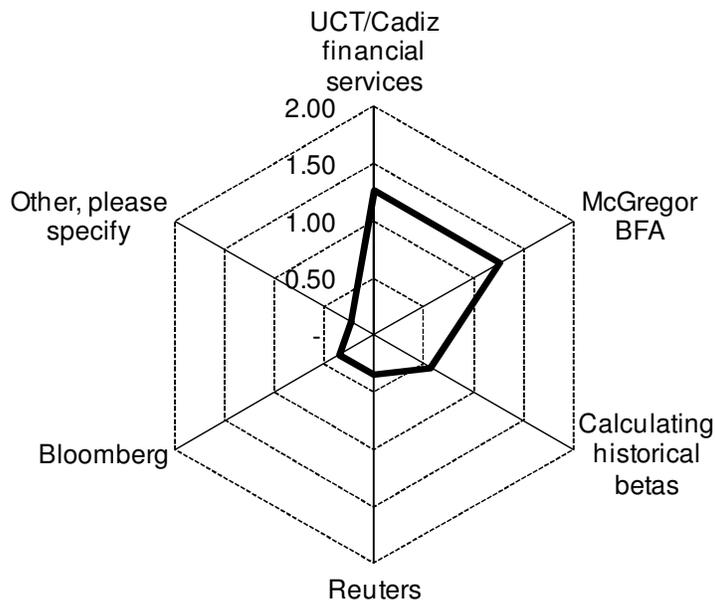
As is evident from Figure 6, the majority of academia favors UCT/Cadiz financial services and McGregor BFA as service providers (both scored a 1.20).

According to academia, the second best option would be to calculate historical betas in-house, followed by either using data from Reuters or Bloomberg. Only 3% of the respondents indicated that beta should be based on

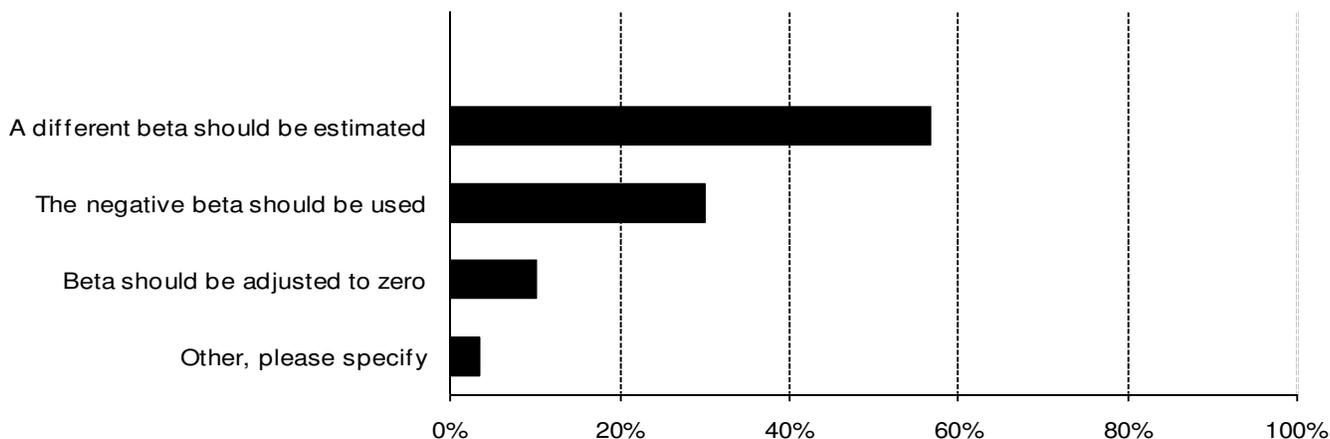
judgment, presumably referring to forward looking betas *vis-à-vis* trailing betas.

The seventh question required respondents to indicate how the CAPM should be approached when entities are confronted with negative betas, which strangely enough are published by service providers (Bradfield, 2003; Arnott et al., 2009). As illustrated in Figure 7, the majority (57%) of the respondents indicated that a different beta should be estimated, while an alarming 30% indicated that the negative beta should be used.

A further 10% of the respondents indicated that beta should be adjusted to zero and 3% indicated that a different approach should be adopted to estimate the cost of equity.



**Figure 6.** Sources for the calculation of beta that, according to academia, should be used most frequently when employing the CAPM in practice.



**Figure 7.** Approach to the use of beta that, according to academia, should be adopted when confronted with a negative beta in practice.

**Gap analysis**

The results of the academic survey, when compared to that of the PwC survey, revealed that academic thinking and investment practitioners' preferences regarding the use of the CAPM and alternative methods for the calculation of the cost of equity differ more frequently than they concur. Six of the eight factors that were compared indicated significant differences, in other words gaps of more than 20%. Despite their differing opinions, academia and investment practitioners agree on certain issues.

**Similarities**

Although academia and investment practitioners place a different emphasis (a 35% gap) on the use of the CAPM, the majority of academia (74% on average) and investment practitioners (100%) agree that the CAPM should be used most frequently in practice. Academia and investment practitioners also seem to agree regarding the calculation of beta. The majority (97%) of respondents from academia indicated that beta should be calculated based on historical figures, a sentiment which is shared by investment practitioners (100%). Although academia

Table 1. Survey results.

Factor	Academia** (%)	Practice** (%)	Gap %	Similar/Different
<b>Cost of equity</b>				
CAPM	74	100	35	Different
APT	58	3	(1 833)	Different
<b>Risk-free rate</b>				
R153	58	17	(241)	Different
R157	51	67	31	Different
<b>Reason*</b>				
Benchmark government bond	41	NI		
Adjusted for taxation	64	4	(1 500)	Different
Which tax rate*		NI	NA	
Company tax rate	38	NI	NA	
<b>Beta</b>				
Historical figures	97	100	3	Similar
<b>Service provider</b>				
Bloomberg	5	43	760	Different
UCT/Cadiz financial services	32	37	16	Similar
McGregor BFA	32	33	3	Similar
<b>Negative beta*</b>				
Estimate a different beta	57	NI	NA	

\*These factors were not included (NI) in both surveys and therefore, a direct comparison was somewhat obscured. \*\*The frequency scores were converted to percentages for comparative purposes.

and investment practitioners differed regarding their preferred service provider for the calculation of beta, they indicated similar support for UCT/Cadiz financial risk-services (32 and 37%, respectively) and McGregor BFA (32 and 33%, respectively) as alternative service providers. The results of the respective surveys are compared in Table 1.

The use of historical betas as an estimate for future betas is somewhat controversial. Empirical evidence suggests that individual stocks are not stable over time, which may cloud the validity of using historical betas as measures of risk (Blume, 1971; Baesel, 1974; Roenfeldt, 1978). Beta should rather be estimated based on the future risk perspective of the asset being valued.

The Gap column in Table 1 indicates the extent of the difference in emphasis between academia and investment practitioners with regard to the calculation of the cost of equity, the risk-free rate and beta. The percentage indicated in the Gap column reflects the extent to which academia and investment practitioners disagree regarding the item in question. A positive percentage indicates that the item is used more frequently in practice than academia would advocate, while a negative percentage implies that academia places a greater emphasis

on the item than investment practitioners. The calculation of beta by using historical figures, for example, displays a relatively small gap (3%), which means that academia and investment practitioners agree that the calculation of beta should be based on historical figures. Table 1 confirms that academia and investment practitioners' preferences are not well aligned, that is they disagree more than they agree.

### Differences

Although the respondents from academia and practice seem to agree that the CAPM is the most preferred method of calculating the cost of equity, they differ rather significantly regarding other considerations. A significant portion of academia (58%) regards APT as an alternative to the CAPM, whereas investment practitioners (3%) place very little emphasis on APT. This constitutes a very large (1 833%) gap between academia and practice, indicating that academia places a far higher premium on APT than investment practitioners do.

An interesting discrepancy between academia and investment practitioners lies in the use of the R153 and

the R157 bonds as proxies for the Rf. Academia (58%) favors the R153, while only 17% of investment practitioners favor the R153 as a proxy for the Rf, constituting a (241%) gap. Similarly, investment practitioners use the R157 (67%) fairly frequently in practice, whereas 51% of the respondents from academia favor the R157.

This discrepancy highlights an important principle when selecting an appropriate Rf. The tenure of the bond should match the term of the investment, that is the choice of the appropriate Rf should be gleaned from the yield curve. Academia's preference for the R153 bond, which at the time of the survey had a 1.7 year term to maturity, above the R157 bond, with a 6.7 year term to maturity, seems rather short sighted. Similarly, very few investment practitioners (4%) adjust the Rf for tax in practice, whereas 64% of the respondents from academia were in favor of such an adjustment. The gap between academia and practice is therefore, a vast (1 500%), indicating that the adjustment is made far less frequently in practice than academia may suggest. Academia (5%) and investment practitioners (43%) also differ in their regard for Bloomberg as a service provider, with a gap of 760%, indicating that investment practitioners have a higher regard for Bloomberg as a service provider than academia.

## SUMMARY AND CONCLUSIONS

The research aimed to establish whether there is a gap between the calculation of the cost of equity, as advocated by academia, and the calculations that leading financial analysts and corporate financiers apply in practice in South Africa.

The reader should bear in mind that the research was based on the beliefs and opinions of chartered accountants, which constitutes a specific target audience within the broader academic environment. One could be inclined to argue that, since there are members of the academic community who lecture valuations who are not chartered accountants, the target audience was narrowly defined, which may have obscured the generalisation of the results. However, since valuations is a key application area in finance and in the SAICA syllabus in particular the research results contribute to the continued development of the academic environment responsible for the future training of chartered accountants. Although the broader academic environment may have similar concerns regarding valuations, which were not included in this study, the author intends to investigate the matter with further research.

Although the research results revealed that there is a significant gap between theory and practice, academia and investment practitioners seem to agree regarding the use of the CAPM and the calculation of beta. Academia and investment practitioners agree that the CAPM is the best approach to calculate the cost of equity. In terms of

the calculation of beta, they agree that beta should be calculated from historical figures. However, academia and investment practitioners disagree regarding the relative frequency of use of the CAPM *vis-à-vis* the APT model. All the investment practitioners indicated that they used the CAPM frequently, compared to academic support of 74%, constituting a 35% gap between academia and practice. The most significant gap between theory and practice is with regard to the use of the APT model. Academia (58%) seems to place significant emphasis on APT, compared to investment practitioners (3%) who seem to have less regard for APT, constituting a significant (1 833%) gap.

The most concerning discrepancy between academia and investment practitioners is perhaps the use of an appropriate Rf in the CAPM. Academia favored the R153, which, at the time of the survey, had a 1.7 year term to maturity, compared to investment practitioners who favored the R157, which, at that stage, had a 6.7 year term to maturity. Academia seems to ignore the underlying principle for selecting an appropriate Rf, which is to match the maturity of the bond with the lifespan of the asset being valued.

This is confirmed by the fact that the majority of academia indicated that the reason for the choice of an appropriate Rf was based on the fact that the R153 was the benchmark government bond. The gaps between academia and practice with regard to the R153 and R157 were (241%) and 31%, respectively. A strange discrepancy surfaced between academia and practice regarding the adjustment of the Rf for tax purposes. The majority of academia (64%) is of the opinion that the Rf should be adjusted for tax purposes, compared to only 4% of investment practitioners, constituting a (1 500%) gap. It is not clear why investment practitioners tend to apply a pre-tax Rf in practice. Post-tax cash flows should be discounted at a post-tax rate.

Although academia and investment practitioners agree that beta should be calculated from historical figures, discounting future cash flows at a rate that encapsulates historic data seems odd.

The more accurate approach would perhaps be to adopt a forward perspective on beta and use that in the CAPM. Academia and investment practitioners also disagree regarding the preferred service provider for the calculation of beta.

Despite investment practitioners indicating Bloomberg as their preferred service provider, only 5% of academia regarded Bloomberg as a frequent service provider, constituting a 760% gap. Although the majority of academia indicated that when confronted with a negative beta, an alternative beta should be estimated, a significant portion (30%) of academia indicated that the negative beta should be used in the CAPM, while a further 10% stated that beta should be adjusted to zero. This is a rather strange phenomenon, since neither of these alternatives would render the CAPM useful. The

first will result in a rate of return which is lower than the  $R_f$ , which no rational investor would be interested in; and the second will result in a rate of return which is equal to the  $R_f$ , which is also not plausible. This paper has highlighted the need for academia and investment practitioners in South Africa to converge on mainstream valuation practices, a phenomenon that is common in developed markets. To this end, academia would do well to inform their students that the underlying concept when choosing an appropriate  $R_f$ , for example, is to match the term to maturity of the bond with the lifespan of the asset being valued, and that the benchmark government bond is not necessarily appropriate. As is evident from the survey results, this is not advocated in lecture halls. Similarly, academia should perhaps present beta with greater clarity, that is explain why historical figures are used, but emphasize that this is, essentially, a second best theory and that a negative beta cannot be applied in the CAPM, despite the fact that service providers publish negative betas.

Similarly, investment practitioners should perhaps take note of the APT as an alternative to the CAPM. Investment practitioners should also consider adjusting the  $R_f$  for tax purposes, as suggested by academia.

The research results provide an insight and guideline to finance lecturers and investment practitioners, in terms of the perception in academia regarding the calculation of the cost of equity and the application of the CAPM. The results indicate that, although academia and investment practitioners agree on the use of the CAPM and certain service providers, they disagree significantly on the use of APT, the choice of an appropriate  $R_f$  and adjusting the  $R_f$  for tax purposes.

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**APPENDIX****List of respondents to the PWC survey**

ABN AMRO Bank of South Africa  
Bridge Capital  
Deutsche Bank  
Ernst and Young  
Ethos  
HSBC Bank  
iCapital  
Investec  
Java Capital  
KPMG  
Kumba Resources  
McGregor BFA  
Morgan Stanley South Africa  
Nedbank Capital  
NM Rothschild and Sons (South Africa)  
Old Mutual Asset Managers  
PricewaterhouseCoopers  
PSG Capital  
Rand Merchant Bank  
SABMiller  
Sanlam  
Sasol  
Standard Bank