

COST OF CAPITAL ESTIMATION AND CAPITAL BUDGETING PRACTICE IN AUSTRALIA

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A survey reveals that real options techniques have gained a toehold in Australian capital budgeting but are not yet part of the mainstream. Projects will most commonly be evaluated using NPV, but techniques such as payback continue to be widely used. Cash flow projections are typically for three to ten years. Terminal values are often estimated as a growing perpetuity, although multiplier methods are also used. Discounting is typically by the weighted average cost of capital, assumed constant for the life of the project, and with same discount rate across divisions. The WACC is usually based on target weights for debt and equity. The CAPM is widely used with the T-bond rate as the risk free rate and an average market risk premium of six percent. Asset pricing models other than the CAPM are not used. The discount rate is reviewed regularly and the inputs to the calculation are varied over time. Only a minority of respondents considered that imputation credits have no value, but in most companies project analysis takes no account of the value of imputation tax credits.

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1 Introduction

Capital budgeting is one of the key issues in corporate finance. Over several decades, major theoretical developments in capital budgeting have been incorporated into corporate practice. It is over four decades since one of the key developments, Sharpe's (1964) publication of the CAPM. American evidence suggest that the adoption of the CAPM in the practice of capital budgeting has been quite widespread (Graham and Harvey, 2001). However, Australian evidence on this issue is almost non-existent. While the CAPM was being increasingly adopted in practice, at least in the USA, it was also coming under academic attack (Fama and French, 1992). At the same time, new approaches to asset pricing and capital budgeting have been developed. The developments in real options, for example, have reached the textbook level (Copeland and Antikarov, 2001), but relatively little is known about the impact of these developments on capital budgeting practice.

More than a decade has passed since the last major Australian survey of capital budgeting was conducted (Freeman and Hobbes, 1991). Given the rate of change in business practices over the 1990s and the developments in the academic literature, it is timely to investigate the extent to which the CAPM and newer theoretical developments have affected Australian practice. We consider a number of issues that have received little or no attention in previous Australian investigations of capital budgeting practice. These include the extent of use of the CAPM and alternative asset pricing models such as the Fama and French three factor model; the inputs companies use when applying the CAPM; whether companies incorporate the value of imputation tax credits into their capital budgeting procedures, and if so, how they do it; the extent to which companies use real options analysis; and consideration of time varying discount rates.¹

The majority of survey respondents employed several techniques to evaluate investment opportunities. Discounted cash flows (DCF) techniques were the most commonly used, with the Net Present Value (NPV) method being more popular than the Internal Rate of Return (IRR) method. Compared with the results of previous surveys conducted in Australia, DCF techniques have become more popular, but rule of thumb techniques, such as the payback period, are not

¹ A copy of the survey instrument is available from the authors on request.

losing ground, they are still widely used in conjunction with the DCF techniques. Company's responses also suggest that real options techniques are establishing a foothold in capital budgeting, although most respondents currently view these techniques as not important.

Consistent with recent overseas studies, (Graham and Harvey (2001), Gitman and Vandenberg (2000), and Bruner, et. al. (1998)) the CAPM is the most popular method used in estimating the cost of capital in Australia. The use of other asset pricing models is virtually non-existent. The majority of respondent companies vary their estimates of the CAPM beta and the market risk premium over time and frequently review their cost of capital estimates. A majority of companies measure their cost of capital as a weighted average cost of capital (WACC) and in doing so adjust the cost of debt for interest tax shields; however, a substantial minority make no interest tax shield adjustment.

Most respondent companies prepare project cash flow forecasts for a period of three to ten years. Over the forecast period a constant discount rate is typically used. Terminal values are estimated either by assuming the terminal cash flow is a growing perpetuity, or by applying a multiplier to either the terminal cash flow, or to terminal earnings. Various assumptions are made about the terminal growth rate, for example, that it equals the average industry growth rate, or the inflation rate, or that it is zero.

With respect to dividend imputation adjustments, the majority of companies surveyed do not account for the value of imputation credits, principally because their value is too difficult to determine, or their impact on the evaluation is perceived to be small. This is an interesting result, particularly given that only a minority of respondents believed that the value of imputation credits was zero.

The paper is organised as follows: in Section 2 literature relevant to the study is reviewed, in Section 3 details about the survey questionnaire, survey sample, and survey process are described, Section 4 provides the survey results and statistical analysis and Section 5 concludes the paper.

2. Literature Review

The most recent Australian capital budgeting surveys were by McMahon (1981), Lilleyman (1984), and Freeman and Hobbes (1991). These surveys reveal a growing popularity for DCF

techniques and reliance on WACC as the discount rate. For example, Freeman and Hobbes (1991) found that 75% and 72% of respondents used NPV and IRR techniques respectively. However methods such as the payback period, accounting rate of return or discounted payback were still used by a substantial number of companies. Similar to McMahon (1981), Freeman and Hobbes found that 62% of respondent companies used WACC to calculate the hurdle rate used in the capital budgeting process. However, 39% of respondents said they relied on the cost of borrowing to determine hurdle rates.

A more recent survey that included Australian companies in the sample, among companies from six Asia Pacific countries, was undertaken by Kester et al (1999). This survey confirmed the popularity of DCF methods in Australia. It was also found that 73% of companies surveyed used CAPM, a subject not included in previous surveys in Australia. The rate of CAPM usage was significantly higher than the usage in the other Asia Pacific countries surveyed, which included Hong Kong, Indonesia, Malaysia, Philippines and Singapore.

Numerous capital budgeting surveys have been conducted in US, UK, and Canada. Graham and Harvey (2001) carried out a comprehensive survey in the US covering the cost of capital, capital budgeting, and capital structure. Similar to the Australian results of Freeman and Hobbes (1991), the IRR and NPV were found to be the most frequently used capital budgeting techniques. Other techniques such as the payback period were less popular but were still being used by a majority of companies. Despite being advocated by academics as a method that could supplement, or replace DCF methods, real option techniques were relatively unpopular, they ranked eighth among twelve techniques considered by Graham and Harvey. Even so, 27% of respondents reported using real options techniques. Graham and Harvey found that CAPM was the most popular method of estimating the cost of equity with 73% of respondents relying mainly on the CAPM. Compared to two previous surveys of US companies, Gitman and Mercurio (1982) and Gitman and Vandenberg (2000), increasing popularity of the CAPM model is apparent.

A survey of UK companies by Arnold and Hatzopoulos (2000) found that DCF techniques were dominant, with 96% of the respondents using either NPV or IRR techniques. In a more recent UK survey, McLaney et al (2004), found that the CAPM is the most popular model used in estimating the cost of capital, but only 47% of companies surveyed used the CAPM compared to the 73%

reported by Graham and Harvey (2001) for the US. McLaney et. al. also found that 53% of UK companies used WACC for project appraisal and 67% said that they took into account tax effects when estimating the cost of capital.

In Canada, Payne, Heath and Gale (1999) carried out a survey in order to compare the capital budgeting practice of US and Canadian companies and found a similar feature in the dominant position of DCF techniques, however in respect to estimating the cost of capital, WACC was more popular in the US than in Canada, and Canadian managers seemed to rely more on personal judgement and experience than their US counterparts.

It may be concluded from the abovementioned surveys in Australia, as well as in other countries, that DCF techniques have become the most popular techniques in making capital budgeting decisions for public companies. Nevertheless, rule of thumb techniques continue to enjoy substantial use. The WACC is widely used as a discount rate and the CAPM is the most popular method used in estimating the cost of equity. These practices accord reasonably well with the prescriptions of corporate finance textbooks.

However, particular limitations of DCF techniques that are well documented, even at the textbook level, for example Brealey et.al. (2000)², are the failure to account for the value created by flexibility in management decisions, and the problem of applying a constant discount rate over the life of a project. The real options approach has been widely advocated as a means to overcome these limitations. Consequently, we would expect an increase in the number of companies using real options techniques, especially in sectors such as biotechnology, or information technology where the values of research and development options are significant, or in the natural resources industries where flexibility can be particularly valuable. Indeed, following on from Brennan and Swartz (1985) much of the early real options literature was about natural resource applications. So far, however, there is limited survey evidence on the use of real options. A notable exception being Graham and Harvey's (2001) result that real options techniques were being used by a minority of companies in the US. Accordingly it is worthwhile to examine the use of real options in Australia, particularly as Australia has a large natural resource sector.

² See Brealey et. al (2000) p.119 and Ch. 21.

In overseas surveys, the CAPM was found to be the most popular method used in the estimation of the cost of capital. The only investigation of the usage of the CAPM in Australia was Kester (1999) which suggests extensive use of the CAPM. In light of academic criticism of the CAPM (Fama and French, 1992), it is of particular interest to see whether this criticism has had an impact on practice.

Another area where there is little systematic evidence about practice is how, if at all, companies adjust project evaluations for the effect of imputation tax credits. The dividend imputation tax system was introduced in Australia in 1987, but it was not until Officer's (1994) paper that there was a substantial theoretical analysis of how imputation might be incorporated into capital budgeting practice. In particular, how the cost of capital might be adjusted to accommodate the effect of imputation tax credits. Other theoretical papers have followed, for example, Monkhouse (1996) and most recently Dempsey and Partington (2004). However, we are aware of no study about how practitioners have dealt with imputation credits in capital budgeting.

3. Survey Sample and Questionnaire

To construct the survey sample, we started with a sample of 488 stocks included in the All Ordinaries Index as at August 2004. The focus of this survey is the capital budgeting practice of Australian corporations; therefore we excluded all foreign companies. Companies in the financial sector were also excluded as we wished to focus on capital budgeting decisions for real assets. The final sample comprises 356 companies in nine sectors.

Companies' addresses and the names of chief financial officers, directors of finance, corporate finance managers, or similar finance positions of 285 companies were obtained from either the Connect4 Database, or the ASX website. For the remaining 71 companies, we were not able to obtain the names of financial officers and the survey letters were addressed to the "Chief Financial Officer".³

Potential respondents were offered the opportunity to obtain the results of the survey. Respondents were also offered the opportunity to make their response anonymously, but a substantial majority chose not to do so. The survey questionnaire was also made available on the server of Hostedware Corporation and respondents could choose to reply using the Internet, or by completing a paper

³ The response rate for the first group was found to be considerably higher than that of the second group.

questionnaire that was sent to each company. We found that the majority of respondents used the paper questionnaire.

The survey questionnaire included 20 questions, some of which were open-ended. The survey was first sent out in late September 2004 and we received 43 responses. Follow up letters were sent out in early November 2004 and we received 44 additional responses. This provided a total of 87 responses of which ten were completed on the internet and 77 were completed in paper form. In addition, ten companies returned the envelopes stating that it was not their policy to participate in surveys and eight envelopes were returned unopened. The overall response rate was 24.4% which is generally higher than surveys conducted overseas, but somewhat lower than similar surveys conducted previously in Australia. Freeman and Hobbes (1991), for example, obtained 113 responses from 289 companies, a response rate of 39%.

Some respondents did not answer all questions. Therefore, in the discussion that follows, the percentage of respondents refers to the percentage of respondents answering the particular question under discussion. The numbers of actual respondents for a given question is presented in the tables accompanying the text.

4. Survey Results and Statistical Analysis

4.1 Respondents' Statistics

Table 1 presents the distribution of respondents by ASX industry sector classifications. Respondents were spread over the nine sectors surveyed. The Materials sector provided the highest number of responses accounting for 31% of total responses, followed by Industrials, Health Care and Consumer Discretionary sectors accounting for 22%, 10% and 10% of responses respectively. The distribution of respondents by sector is not substantially different from the distribution of the target survey sample originally selected.

The distribution of annual revenue for respondent companies is given in Table 2. The average size of respondents' companies in term of revenue is A\$1.32 billions compared to A\$1.16 billions for the target sample. Companies with revenue of more than A\$1 billion per year represent 33% of the sample. The average market capitalization of respondent companies is A\$1.7 billion.

Statistics in relation to positions of respondents and their time spent with companies are presented in Table 3. On average, respondents have spent five years with their companies and 79% of respondents hold senior financial positions such as chief financial officer, director of finance, financial controller, or treasurer. The remaining respondents also hold relevant senior positions such as chief executive officer, executive director, business development manager, manager of corporate planning, and business analysts.

4.2 Techniques Used In Project Evaluation

In order to understand the usage and importance of capital budgeting techniques we listed eight different techniques and asked companies to tick all relevant techniques as well as to rank their importance. Five rankings were provided: Not Applicable, Not Important, Moderately Important, Important and Very Important. Respondent companies are considered as using a particular technique if they ticked any of the rankings except for the ‘Not Applicable’ box.

As can be seen in Table 4, Panel A, NPV, Payback Period, and IRR are the techniques most frequently used by the Australian companies participating in the survey. NPV and Payback are the two most popular methods, with over 90% of the companies reporting they used these techniques.

The ranking of techniques by importance is presented in Panel C of Table 4, and is similar to the ranking by frequency of use. The NPV, IRR, and Payback are at the top of the ranking. Kendall’s coefficient of concordance, reported at the foot of Panel C, shows that a statistically significant consensus exists between respondents on the ranking by order of importance.⁴ NPV stands out as the most popular and important technique, with 57% of companies ranking it as the most important technique. Some companies listed “other” techniques which they considered as “Very Important” in their evaluation such as “strategic fit”, “earnings multiple”, “EVA”, “EPS” or “return on funds employed”.

About one third of respondents (32%) reported the use of real options techniques. However none of the respondents ranked the use of real options as very important and only 9% ranked these techniques as of moderate or higher importance. Thus real options techniques were considered one

⁴ An almost identical ranking was obtained by taking the full set of eighty-seven respondents and ranking the techniques by the number of companies indicating that the technique was very important.

of the least important of the techniques included in the survey. Consequently, it may be concluded that real options techniques have established a foothold in the practice of capital budgeting in Australia but they have not yet achieved the status of a mainstream technique.

Most companies did not rely on a single capital budgeting technique but employed a number of techniques in their evaluation process. Assuming that techniques ranked moderately important, or higher, are regularly used, 27% of respondents regularly used from one to three techniques, the rest regularly used more than three techniques. Details are shown in Panel B of Table 4.

A brief comparison of findings of Australian surveys and recent surveys carried out in the USA, UK and Canada is shown in Table 5. Comparing the results of previous surveys in Australia with the current survey, NPV has clearly established its position as the most popular capital budgeting technique. Ratings of importance of the techniques also show that NPV is viewed as the most important technique.

The results of this survey tend to confirm the results of the survey by Kester et al (1999). One difference, however, is that Kester et. al. found that the IRR was ranked as being of equal importance to NPV. In our survey, the IRR has lost ground and has a ranking below the Payback techniques (as shown in Table 4, Panel C.) This suggests that companies are not abandoning rules of thumb techniques, but that they are using them in conjunction with DCF techniques.

In respect of the use of real options techniques, the incidence of use in Australia at 32% is apparently higher than the 27% found by Graham and Harvey (2001) for the US. However the incidence of use in the US is based on respondents who “always” or “almost always” used the technique. Based on ranking by importance the comparable figure for Australia is probably 4% (Important) to 9% (Moderately Important or Important).

4.3 Estimation of the Cost of Capital

Table 6 presents information on the use and estimation of the cost of capital. A substantial majority of respondent companies (88%) used a cost of capital in their investment evaluation techniques. The company’s cost of capital estimates were subject to regular review, with a majority of companies conducting such reviews on an annual or shorter cycle.

The majority of the respondents said they estimated cost of capital themselves, but a substantial minority used both their own estimates and estimates from external sources. The most frequently cited external sources of estimates were financial institutions and analysts. The CAPM is the most popular method used in estimating the cost of capital with 72% of respondent companies using the CAPM. The second most popular method (47%) is to use the cost of debt plus some premium for equity. It seems that alternative asset pricing models have not been adopted in Australian practice. Only one respondent used a multifactor asset pricing model, and no respondent used the Fama and French three factor model.

With the exception of Kester et. al. (1999) there is little Australian evidence on the use of the CAPM. Our results are similar to Kester et. al. who found that 73% of respondents used the CAPM to estimate the cost of equity. The Australian results are also similar to Graham and Harvey (2001) and Gitman and Vandenberg (2000) for the US as can be seen from the comparisons presented in Table 7. However, the usage of the CAPM in Australia is substantially higher than in the UK (McLaney et al, 2004), or Canada (Jog and Srivastava, 1995).

Most respondents (84%) estimate a WACC. In computing the WACC 60% of companies said they used target weights and 40% used current weights. In regard to the choice between market and book weights there was a substantial drop in the number of respondents. Those companies that responded showed a nearly even balance between those who used market value weights (51%), and those who used book value weights (49%). In estimating WACC, 69% of respondents reported adjusting the cost of debt for the interest tax shield and 31% said they did not.

The use of book values weights is in clear conflict with the prescriptions of financial theory. A similar comment might be applied to the failure to adjust the cost of debt for the value of interest tax shields, but this treatment is not necessarily incorrect. Companies should not adjust for the value of interest tax shields if those tax shields have no value. This could be the case, for example, if the company was unable to utilise the tax shield, or if the interest tax shield displaced imputation credits that were fully valued in the market.

To investigate how companies apply the CAPM model in practice, we asked about inputs to the model including selection of the risk free rate, beta, and the market risk premium. The results are

reported in Table 8. Fifty three companies reported using the CAPM, but some respondents did not answer all the questions about inputs to the CAPM, particularly in relation to the magnitude of the market risk premium. Most companies used the T-bond rate as proxy for risk free rate, used a public source for their beta estimate, and used a market risk premium in the range 5%-8%.

The average market risk premium for the 38 companies who provided the actual rate, or ranges of rates, that they used, is approximately 6%. This value is the lower bound of market risk premium suggested in the study of Gray (2001). The majority of respondents also claimed to have used varying values for the risk free rate, market risk premium, and beta. We are only aware of one other survey that has investigated these issues, Bruner et al (1998), who found that in the US, long term treasury bonds were used as a proxy for the risk free rate, beta was obtained from public sources, and a variety of assumptions were made about the market risk premium.

4.4 Project Discount Rates and Terminal Values

In this section we examine how the discount rate is selected for individual projects, how many years ahead the companies forecast, how they estimate terminal values, and whether they adjust the discount rate over the forecast period. The results are given in Table 9.

The majority of companies (57%) used the company's discount rate in project evaluation, the second most popular alternative (22%) was the cost of debt plus some risk premium, and a number of respondents (17%) relied on previous experience. Different discount rates for different divisions were reported by 16% of companies,⁵ and 13% of companies reported that they would use the divisional discount rate for individual projects. Finance theory suggests that different discount rates should be used for projects of different risk. Unfortunately, we did not ask about project risks, therefore we cannot determine the extent to which discount rates were tailored to project risk. The results here are similar to those of McMahon (1981) and Freeman and Hobbes (1991) for Australia, and also to overseas studies such as Payne et. al. (1999), Arnold and Hatzopoulos (2000) and McLaney et. al. (2004).

The length of the cash flow forecast period varies from less than three years to more than ten years, but 5 to 10 years is the most common forecast interval (43%). The terminal value, estimated at the

⁵ This result, which is not included in Table 9, is based on 77 responses.

end of the forecast period, is most commonly based on the present value of cash flows in perpetuity (42%). Multiplier methods applied to terminal earnings, or cash flow, were used by 23% of companies and 16% of companies used both the perpetuity and multiplier methods. However 20% of respondents said they used terminal book value, which is difficult to square with finance theory. Some respondents noted that they run cash flow projections until the end of project life and that methods of estimating terminal values depended on the project. In the US, Bruner et al (1998) found that 70% of financial advisors interviewed used both multiples and terminal cash flow in perpetuity, while 30% used multiples only.

If a company estimates a project's terminal value using future cash flow in perpetuity, it needs to assume a terminal growth rate. We found a variety of assumptions for terminal growth rates, with 38% of responses indicating that the terminal growth rate depended on the project. Other choices involving more than 10% of respondents were the inflation rate, the average industry growth rate, or a zero growth rate. In this area academic research has not provided much guidance. Given the importance of terminal values to many projects further research seems worthwhile.

If the risk of the project is expected to vary over time, so should the discount rate. However, 84% of respondents said they never, or rarely, adjusted the discount rate over the forecasting period. This is an interesting result as we observed above that the majority of companies used time-varying inputs to estimate their cost of capital and they reviewed this estimate frequently. Despite this, most then apply a fixed discount rate for the forecast horizon of the project under consideration. For the minority who did adjust the discount rate, 58% said they adjust according to expected changes in the level of project risk and 25% said they adjust according to term structure of interest rate.⁶ We are unable to compare these results with prior research as the issue of time-varying discount rates has not been included in previous surveys

4.5 Adjustments for Dividend Imputation Credits

The findings on adjustment for imputation credits in capital budgeting are presented in Table 10. In general the companies surveyed (83%) have ignored the impact of imputation tax credits in the capital budgeting process. The majority of respondent companies said they did not adjust for imputation credits when estimating beta, or the market risk premium, or when they carry out

⁶ Since only a minority of companies adjust their discount rate the number of responses on this issue was small at only 24.

project evaluations. However, thirteen companies (17% of respondents) said that they did make adjustments either to the cost of capital, or to the cash flow, or both, when evaluating projects.

Companies adjusting for imputation tax credits use various gamma factors (the market value of franking credits as a percentage of their face value) ranging from 1% to 100% and the majority of those respondents said they used their own analysis to determine gamma. However, the sample size is too small to reach any definitive conclusions about these adjustments.

For those companies who did not make any adjustments, various reasons were given, the most frequently cited reasons were either “it is difficult to set an appropriate tax credit value for all investors” or “it should have a very small impact on the evaluation result.” The least popular response (10%) was that the value of imputation credits was zero.

This lack of adjustment for imputation credits may involve a significant understatement of the value of project cash flows. The upper limit on such understatement is given by assuming that credits are fully valued and immediately distributed, which gives each dollar of cash flow after corporate tax a value of \$1.43 under the current 30 percent corporate tax rate. Even if we assume that the credits are only valued at a quarter of their face value, omission of credit values means that the cash flow is understated by 10.7 percent under the 30 percent tax regime.

5. Conclusions

The questionnaire responses suggest the following profile for a typical respondent company. Projects will usually be evaluated using NPV, but the company is likely to also use other techniques such as the payback method. The project cash flow projections will be made from three to ten years into the future and terminal values at the forecast horizon will be estimated as a growing perpetuity, although multiples of terminal cash flow or earnings might also be used. There is no dominant method for estimating the growth rate when computing terminal values, but the industry average growth rate, or inflation rate, are two quite popular choices.

The project cash flow will be discounted at the weighted average cost of capital as computed by the company, and most companies will use the same discount rate across divisions. The discount rate will also be assumed constant for the life of the project. The WACC will be based on target weights for debt and equity. The CAPM will be used in estimating the cost of capital, with the T-

bond used as a proxy for the risk free rate, the beta estimate will be obtained from public sources, and the market risk premium will be in the range of six to eight percent, with six percent more likely. Asset pricing models other than the CAPM will not be used in estimating the cost of capital. The cost of debt will be adjusted to allow for the effect of interest tax shields, but not by a significant minority of companies. The discount rate will be reviewed regularly, at least annually, and the inputs used in the calculation are varied over time.

In valuing projects no account will be taken of the value of imputation tax credits. The credits will be ignored in computing beta and the market risk premium, in computing the WACC, and in estimating cash flows. Despite the overwhelming majority of companies making no adjustment for the value of imputation credits only a very small minority of companies considered the value of imputation credits to be zero. The main reasons for not making an adjustment are the difficulty of the task, or the belief that the value effect is small.

Developments in asset pricing post-CAPM do not seem to have influenced the estimation of the discount rate. However, real options techniques have gained a toehold in project evaluation. They are used by a substantial minority of companies, although they are generally regarded as unimportant. It will be interesting to see whether there is any future growth in their use.

The current practice of the Australian companies surveyed reflects the prescriptions of corporate finance texts in many aspects. However, for some companies there are significant departures from such prescriptions, for example, the use of book values in computing weights for the WACC. It is also interesting that the CAPM remains the pre-eminent asset pricing model in practice, despite increasing academic criticism and the development of alternative multifactor asset pricing models.

Another issue is the application of the time-varying risk concept in practice. While it seems that companies surveyed acknowledged the time-varying nature of risk, they applied a fixed discount rate in their evaluation techniques. No reasons for this were obtained, but possibly it is considered too difficult to reliably forecast time variation in discount rates. There are parallels here with the perceived difficulty in making adjustments for imputation tax credits.

Like other studies of this kind, this survey has potential limitations. There is no guarantee that the respondents reflect the target sample, nevertheless, with annual revenue totalling in excess of \$100

billion, the respondent group are economically important in their own right. We also rely on the responses being an accurate indicator of company's practices; confidence in this matter is enhanced by the seniority and nature of the positions occupied by respondents. By restricting the length of the questionnaire in order to improve the response rate, some issues could not be investigated in detail. Nevertheless, questionnaire surveys, such as this one, have the benefit of updating our knowledge of practice, identifying gaps between theory and practice, and thus suggesting areas for future research that might bridge those gaps.

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Table 1 - Responses by Industry Sectors

<i>Sector ⁽¹⁾</i>	<i>Respondent companies</i>		<i>Whole sample</i>	
	<i>Number of companies</i>	<i>%</i>	<i>Number of companies</i>	<i>%</i>
Energy	5	6%	17	5%
Consumers Discretionary	9	10%	67	19%
Health Care	9	10%	45	13%
Industrials	19	22%	61	17%
Consumers Staples	7	8%	28	8%
Information Technology	4	5%	31	9%
Telecommunication Services	2	2%	9	3%
Materials	27	31%	90	25%
Utilities	3	3%	8	2%
Other	2	2%	0	0%
Total	87	100%	356	100%

(1) Sector categories are based on ASX classifications for companies in the ASX All Ordinary Index, the category other indicates companies which it was not possible to classify.

Table 2 - Responses by Company Size

<i>Size</i>	<i>Respondent companies</i>		<i>Whole sample</i>	
	<i>Number of companies</i>	<i>%</i>	<i>Number of companies</i>	<i>%</i>
Less than A\$50 millions	18	21%	101	28%
A\$50 - 100 millions	9	10%	39	11%
A\$100 - 250 millions	15	17%	62	17%
A\$250 - 500 millions	7	8%	53	15%
A\$500 - A\$1 billion	9	10%	36	10%
More than A\$1 billion	29	33%	65	18%
Total	87	100%	356	100%
Average revenue ¹	A\$1.32 billions		A\$1.16 billions	

(1) Average revenue of respondent companies is estimated based on revenue of 74 companies that identified themselves in their response. Revenue data is taken from latest annual reports available on the Connect4 Database, or from company websites.

Table 3 - Respondents' Average Time Spent with the Company and Position Held

Panel A - Average time spent with companies		
<i>Time spent with companies</i>	<i>Number of responses</i>	<i>%</i>
more than 10 years	7	8%
8 to 10 years	9	11%
4 to 7 years	22	26%
1 to 3 years	27	32%
up to 1 year	19	23%
Total	84	100%
Average time spent with respondent's firm	5	years
Panel B - Positions held		
<i>Positions</i>	<i>Number of responses</i>	<i>%</i>
CFO, Director of Finance, Finance Controller, Treasurer	67	79%
Manager of Corporate Development, Corporate Planning, Senior Business Analysts and similar positions	14	16%
Corporate Accountant, Group Accountant	4	5%
Total	85	100%

Table 4 - Evaluation Techniques Used and their Importance

Panel A - Number of companies using the following techniques in their project evaluation			
<i>Techniques</i>	<i>Number of companies</i>	<i>Responses %</i>	
Net Present Value	82	94%	
Payback Period	79	91%	
Internal Rate of Return	70	80%	
Hurdle Rate	63	72%	
Accounting RoR on Assets	50	57%	
Adjusted Net Present Value	47	54%	
Value at Risk	35	40%	
Real Options Method	28	32%	
Other Techniques	11	13%	
Total responses	87		

Panel B - Number of companies grouped by number of techniques used			
<i>Number of techniques used in evaluation</i>		<i>Responses</i>	
		<i>Number of companies</i>	<i>%</i>
1		2	3%
2		7	9%
3		12	16%
4		20	26%
5		17	22%
6		13	17%
7		1	1%
8		4	5%
9		1	1%
Total responses		77	100%

Note: We include only techniques that were ranked as Moderately Important, Important or Very Important. Only 77 companies who responded using paper questionnaires are included in this Analysis. For online responses it was not possible to determine how many techniques a particular company used.

Panel C: Test of significance of difference of importance between techniques							
<i>Techniques</i>	<i>Not applicable</i>	<i>Not important</i>	<i>Moderately Important</i>	<i>Important</i>	<i>Very Important</i>	<i>Average Score¹</i>	<i>Number of companies</i>
NPV	4%	1%	9%	29%	57%	4.34	66
Payback	10%	5%	25%	32%	27%	3.61	75
IRR	19%	1%	16%	34%	30%	3.53	71
Hurdle Rate	29%	9%	13%	26%	23%	3.06	59
ANPV	47%	13%	17%	16%	8%	2.25	56
ARR	43%	17%	21%	13%	6%	2.23	52
VAR	60%	17%	12%	9%	3%	1.78	52
Real Option	66%	25%	5%	4%	0%	1.47	54
Other	88%	0%	0%	1%	10%	1.45	10

Kendall's Coefficient of Concordance: $W = 0.466$, $df = 8$, $N = 77$ $p < 0.001$

Note 1: The average score is computed using a scale ranging from 1 for not applicable to 5 for very important. Only 77 companies who responded using paper questionnaires are included in the table.

Table 5 –Evaluation Techniques of Australian Companies Compared Over Time and with Practice Overseas

	<i>Australia</i>				<i>Overseas</i>		
	<i>This survey (2004)⁴</i>	<i>Kester et al (1999)^{1 & 4}</i>	<i>Freeman & Hobbes (1991)²</i>	<i>McMahon (1981)</i>	<i>US Graham & Harvey (2001)</i>	<i>UK Arnold & Hatzopoulos (2000)</i>	<i>Canada Payne et al (1999)³</i>
	<i>% use (rank)</i>	<i>% use (rank)</i>	<i>% use</i>	<i>% use</i>	<i>% use</i>	<i>% use</i>	<i>rank</i>
Techniques							
Net Present Value	94% (1)	96% (1)	75%	52%	75%	80%	1
Internal Rate of Return	81% (3)	96% (1)	72%	66%	76%	81%	2
DCF profitability index			23%	7%	12%		
Payback Period	90% (2)	93% (3)	44%	53%	57%	70%	3
Discounted Payback			27%	49%	29%		4
Hurdle Rate	71% (4)				57%		
Accounting RoR on Investment			33%				
Accounting RoR on Assets	57% (5)	73% (4)				56%	5
Adjusted Net Present Value	54%				11%		
Value at Risk	40%				14%		
Real Options Method	32%				27%		
Other Techniques	13%	21%	49%	7%		31%	
Details of Surveys							
Year surveyed	2004	1997	1989	1979	1999	1997	1994
Survey sample size	356	281	289	220	4440	296	588
Number of usable responses	87	57	113	106	392	96	65
Response rate	24%	20%	39%	48%	9%	32%	11%

Note 1: This survey covers six countries in the Asia Pacific region, only the sample relevant to Australia is reported here.

Note 2: Freeman and Hobbes conducted a survey of 289 companies, but the result reported relating to capital budgeting technique usage is for the top 150 companies only.

Note 3: This survey include a sample of 852 US companies and 588 Canadian companies, only a part of the sample and result relevant to Canadian practice is reported here.

Note 4: In brackets are orders of importance based on mean ratings for each technique (1 to 5 in this survey and 0 to 5 in the Kester et. al. survey)

Table 6 - Practices Used in Estimating the Cost of Capital

	<i>Number of Responses</i>	<i>%</i>
Whether companies used cost of capital in their evaluation techniques:		
Yes	74	88%
No	10	12%
Total number of answers	84	100%
Source of cost of capital estimates:		
Self-estimate	41	55%
Obtained from another source	5	7%
Both	28	38%
Total number of answers	74	100%
Methods used in estimating the cost of capital:		
Average historical returns	8	11%
Capital Asset Pricing Model (CAPM)	53	72%
Dividend yield plus forecast growth rate	7	9%
Fama & French Three Factor Model	0	0%
E/P Ratio	11	15%
By regulatory decisions	3	4%
Cost of debt	25	34%
Multi-factor asset pricing model	1	1%
Cost of debt plus some premium for equity	35	47%
Other technique	0	0%
Total number of answers	74	
Whether companies estimate WACC:		
Yes	65	84%
No	12	16%
Total number of answers	77	100%
Number of companies estimating WACC:	65	100%
of which - number of companies adjusting for interest tax shield	45	69%
- number of companies not adjusting for interest tax shield	20	31%
Weighting factors used in estimating WACC		
Target	39	60%
Current	26	40%
Market value	20	51%
Book value	19	49%
Review of cost of capital estimates:		
Quarterly	7	9%
Semi-annually	16	21%
Annually	25	32%
Whenever there is a new project to be evaluated	23	30%
Whenever there is a significant change in business environment	14	18%
At the time of performance evaluation	1	1%
Total number of answers	77	

Table 7 –Cost of Capital Practices of Australian Companies Compared Over Time and with Practice Overseas

	<i>Australia</i>		<i>Overseas</i>			
	<i>This survey² (2004)</i>	<i>Kester et al (1999)¹</i>	<i>US Graham & Harvey (2001)</i>	<i>US Gitman & Vandenberg (2000)</i>	<i>UK McLaney et al (2004)</i>	<i>Canada Jog & Srivastava (1995)</i>
Methods of estimating the cost of capital:						
Average historical returns	11%		39%			
Adjusted historical common stock return						10%
Capital Asset Pricing Model (CAPM)	72%	73%	73%	65%	47%	16%
Use dividend yield plus forecast growth rate	9%	16%	16%	14%	28%	13%
Fama & French Three Factor Model	0%					
E/P Ratio	15%			3%	27%	13%
By regulatory decisions	4%		7%			
Cost of debt	34%					
Multi-factor asset pricing model	1%					
APT				1%		
Use CAPM but including some extra risk factors			34%			
Cost of debt plus some premium for equity	47%	11%		17%		15%
Investors' required returns			14%			
Judgment						30%
Market return adjusted for risk				14%		
Accounting return on equity						25%
Other technique		4%				
Details of Surveys						
Year surveyed	2004	1997	1999	1997	1997	1991
Survey sample size	356	281	4440	1000	1292	582
Number of usable responses	87	57	392	111	193	133
Response rate	24%	20%	9%	11%	15%	23%

Note 1: This survey covers six countries in the Asia Pacific region, only the sample relevant to Australia is reported here.

Note 2: The survey question asked generally about techniques used in estimating the cost of capital while other surveys included in the table asked specific questions about methods used to estimate the cost of equity capital

Table 8 - Application of the CAPM in Practice

For the risk free rate use:	<i>T-Bond</i>	<i>T-Bill</i>	<i>Other</i>	<i>No of responses</i>
	87%	13%	0%	53
	<i>Fixed</i>	<i>Varying</i>		
	13%	88%		48
For beta use:	<i>Public source</i>	<i>Self estimate</i>	<i>Other</i>	<i>No of responses</i>
	60%	33%	8%	52
	<i>Fixed</i>	<i>Varying</i>		
	9%	91%		52
For the market risk premium use:	<i>Rate</i>	<i>%</i>		<i>No of responses</i>
	3% - 5	11%		4
	5%-5.5%	11%		4
	6%	47%		18
	6.5% - 7%	18%		7
	6%-8%	8%		3
	Other	5%		2
				38
	Average rate	5.94%		
	<i>Fixed</i>	<i>Varying</i>		
	36%	64%		33
The MRP is determined based on:		<i>%</i>		<i>No of responses</i>
Domestic market portfolio return		24%		13
Global market portfolio return		13%		7
Depends on project		16%		9
Traditional standards (e.g. 6% or 8%)		53%		29
Other		5%		3
				55

Table 9 - Determination of discount rate for project evaluation

Appropriate discount rate is determined based on:	<i>Number of companies</i>	<i>%</i>
Use firm's discount rate	44	57%
Refer to discount rates of companies in similar business	9	12%
Use cost of debt plus some premium	17	22%
Use financing rate (e.g. borrowing rates)	6	8%
Use the discount rate representative of a related industry	10	13%
Based on previous experience	13	17%
Use the discount rate of the division involved in that project	10	13%
Other	4	5%
Total number of answers	77	
Length of forecast period:		
Less than 3 years	6	8%
3-5 years	17	23%
5-10 years	32	43%
More than 10 years	12	16%
Depends on project	21	28%
Total number of answers	75	
How often the discount rate is adjusted over the forecast period		
Never	45	59%
Rarely	19	25%
Occasionally	12	16%
Often	0	0%
Total number of answers	76	
If there is adjustment, how the adjustment is made:		
Adjust to reach industry's average cost of capital at some stage	2	8%
Adjust to reach market return at some stage	3	13%
Adjust according to expected changes in the level of project risk	14	58%
Adjust according to term-structure of interest rate	6	25%
Other	1	4%
Total number of answers	24	
How the terminal value is determined:		
Use present value of future cash flow in perpetuity	29	42%
Use multiples (e.g. multiples of terminal earnings or cash flow)	16	23%
Both	11	16%
Use terminal book value	14	20%
Other	8	12%
Total number of answers	69	
How the terminal growth rate is determined:		
Average industry growth rate	9	15%
GDP growth rate	4	7%
Firm's historical growth rate	1	2%
Zero growth rate to be conservative	10	17%
Depends on project	23	38%
Inflation rate	11	18%
Other	8	13%
Total number of answers	60	

Table 10 - Adjustment for Imputation Tax Credits

	<i>Number of companies</i>	<i>%</i>
Whether companies adjust stock returns for the value of imputation tax credit when estimating beta		
Yes	5	15%
No	28	85%
	33	100%
Whether the MRP used to estimate cost of capital is adjusted for the value of imputation tax credits:		
Yes	8	15%
No	45	85%
	53	100%
Whether companies make adjustment for imputation credits in project evaluation:		
Yes	13	17%
No	64	83%
	77	100%
If they do, how the adjustments are made:		
Adjustments are made to the forecast cash flow	3	23%
Adjustments are made to the cost of capital	6	46%
Adjustments are made to both the forecast cash flow and cost of capital	4	31%
	13	
What gamma factor is used:		
100%	2	22%
51% to 99%	1	11%
50%	4	44%
1% to 49%	2	22%
	9	
Basis of determining the gamma factor:		
Company's own analysis	4	50%
Published research	2	25%
Regulatory decisions	1	13%
Other	2	25%
	8	
If they don't adjust for imputation, the reasons are:		
It's difficult to set an appropriate tax credit value for all investors	22	37%
Imputation credit should have a very small impact on evaluation result	15	25%
The market already adjusts stock prices therefore imputation credit is taken into account in cost of capital estimate already	14	23%
It is too complicated	11	18%
Imputation credits are irrelevant to overseas shareholders	10	17%
Credits have zero market value	6	10%
Other	11	18%
	60	