

The Cost of Capital Report

As at 31 March 2005

Project Evaluation and Discount Rates

Financial analysis of capital expenditure proposals and business acquisitions and divestments is an important discipline in most businesses. Use of some form or variation of net present value (“NPV”) analysis (including IRR) to evaluate projects is common practice. The degree of sophistication in applying NPV varies considerably among businesses, and even within businesses. Often the degree of detail and level of analysis is influenced by the materiality of projects. Larger projects will, naturally, be analysed in greater detail.

A common issue we encounter when reviewing NPV analysis for clients is the use of “hurdle rates” as the discount rate, as opposed to objectively determined discount rates based on weighted average cost of capital. Invariably hurdle rates are set at a level higher than the “theoretical” opportunity cost of capital. The higher hurdle rate is usually explained by the need to allow for “risk” or to ration the available capital among competing investment opportunities.

More often than not the argument for the inclusion of a risk premium in the hurdle rate is supported by a perception that it is difficult to factor risk accurately or appropriately into the cash flow forecasts. The discount rate is adjusted upwards to compensate for this. In this context “risk” is viewed as the likelihood of actual results being worse than forecast results. It is not often in practice that risk is regarded as including the possibility of actual results exceeding forecast.

While using a hurdle rate that incorporates an “adjustment” for risk has intuitive appeal and might be considered pragmatic, it is problematic because there is no theoretical basis for setting the rate. How much allowance for risk should be incorporated in the discount rate? How much is enough?

The alternative is to use a cost of capital incorporating an



Cogs and pipes. Photographed by Eric Hausman

orthodox cost of equity specification that is consistent with portfolio theory. This provides a rigorous basis for specifying the discount rate and, importantly it dictates the basis on which the cash flow forecasts should be prepared.

Cost of capital theory is based on the assumption that investors will evaluate an investment opportunity based on the expected cash flow and an appropriately specified discount rate (the cost of capital). The expected cash flow will be the probability weighted average of all possible future cash flows that the investment might generate. If actual results vary from the probability

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Input Assumptions:

Market Risk Premium	7.5%	Marginal Tax Rate On Debt	33.0%
Risk Free Rate Of Return	6.4%	Investor Tax Rate On Equity	28.0%

Company	NZSE Code	EBIT Multiple	NPAT Multiple	Equity Beta	D / (D + E) Ratio	WACC
Agriculture						
Affco Holdings Ltd	AFF	3.8	3.7	0.75	8%	9.9%
Pyne Gould Guinness Ltd	PGG	10.9	11.5	0.58	48%	7.5%
Sanford Ltd	SAN	5.2	7.8	0.43	0%	7.8%
Wrightson Ltd	WRI	18.4	26.4	0.76	7%	10.0%
						8.5%
Building Materials & Construction						
Fletcher Building Ltd	FBU	9.2	13.0	0.83	26%	9.3%
Nuplex Industries Ltd	NPX	10.3	13.9	0.64	33%	7.9%
Steel & Tube Holdings Ltd	STU	9.2	13.7	0.90	8%	10.9%
						9.3%
Consumer						
Briscoe Group Ltd	BGR	7.0	10.6	0.63	1%	9.3%
The Colonial Motor Co Ltd	CMO	5.8	7.7	0.37	18%	7.1%
Hallenstein Glasson Holdings Ltd	HLG	9.4	13.6	0.56	1%	8.7%
Kirkcaldie & Stains Ltd	KRK	11.9	21.9	0.49	39%	7.6%
Michael Hill International Ltd	MHI	14.2	20.7	0.44	12%	7.6%
Pacific Retail Group Ltd	PRG	38.7	-5.5	1.38	78%	9.6%
Restaurant Brands New Zealand Ltd	RBD	9.9	14.5	0.87	19%	10.2%
Turners Auctions Ltd	TUA	10.4	14.6	0.68	5%	9.5%
Vending Technologies Ltd	VTL	15.5	14.2	2.08	74%	10.6%
Wakefield Hospital Ltd	WFD	12.0	14.5	0.38	22%	7.2%
The Warehouse Group Ltd	WHS	13.6	19.8	0.62	22%	8.4%
						8.7%
Energy						
Contact Energy Limited	CEN	15.0	26.0	0.51	24%	7.7%
Horizon Energy Distribution Ltd	HED	11.2	16.4	0.47	21%	7.6%
Infratil Ltd	IFT	20.6	35.6	0.89	28%	9.6%
NGC Holdings Ltd	NGC	13.1	16.2	0.76	25%	8.9%
The New Zealand Refining Co Ltd	NZR	13.9	22.4	0.49	0%	8.2%
Trustpower Ltd	TPW	17.1	26.5	0.89	19%	10.1%
						8.6%
Forestry & Forest Products						
Carter Holt Harvey Ltd	CAH	-6.2	-3.9	1.20	31%	11.0%
Evergreen Forests Ltd	EVF	-9.8	-3.9	0.83	64%	8.1%
Tenon Ltd	TEN	7.7	-7.6	1.47	10%	14.7%
						11.2%
Intermediate & Durables						
EBOS Group Ltd	EBO	10.8	13.5	0.59	15%	8.6%
Fisher & Paykel Appliances Holdings Ltd	FPA	10.2	9.2	0.61	41%	7.6%
Fisher & Paykel Healthcare Corporation Ltd	FPH	18.8	27.8	0.62	1%	9.2%
Provenco Group Ltd	PVO	14.5	18.8	2.52	11%	21.7%
Scott Technology Ltd	SCT	11.2	16.8	0.89	0%	11.2%
						8.9%
Investment						
Genesis Research & Development Corp Ltd	GEN	-0.6	-0.6	1.11	4%	12.7%
Hellaby Holdings Ltd	HBY	12.7	15.4	0.71	13%	9.4%
Sealegs Corporation	SLG	-5.1	-5.0	2.58	2%	23.7%
						10.0%

Company	NZSE Code	EBIT Multiple	NPAT Multiple	Equity Beta	D / (D + E) Ratio	WACC
Leisure & Tourism						
CDL Hotels New Zealand Ltd	CDL	10.7	18.4	1.03	22%	11.0%
Sky City Entertainment Ltd	SKC	15.0	20.5	0.68	29%	8.3%
Tourism Holdings Ltd	THL	10.5	15.5	1.22	25%	11.9%
						8.8%
Media & Telecommunications						
GDC Communications Ltd	GDC	41.7	-48.0	1.45	31%	13.0%
Independent Newspapers Ltd	INL	21.4	31.1	1.44	10%	14.4%
Sky Network Television Ltd	SKY	49.0	70.9	1.47	9%	14.6%
Telecom Corp of New Zealand Ltd	TEL	11.1	15.7	1.60	27%	13.4%
						13.7%
Mining						
New Zealand Oil & Gas Ltd	NOG	16.2	15.8	0.82	0%	10.7%
						10.7%
Ports						
Auckland International Airport Ltd	AIA	17.6	26.2	0.75	19%	9.2%
Lyttelton Port Co Ltd	LPC	11.2	14.6	0.49	21%	7.7%
Northland Port Corporation (NZ) Ltd	NTH	30.8	34.0	0.43	2%	7.7%
Ports of Auckland Ltd	POA	9.0	12.0	0.60	13%	8.5%
Port of Tauranga Ltd	POT	14.0	19.6	0.39	22%	6.9%
South Port New Zealand Ltd	SPN	10.2	14.1	0.36	18%	7.1%
						8.6%
Property						
AMP NZ Office Trust	APT	18.5	12.2	0.56	47%	7.3%
CDL Investments New Zealand Ltd	CDI	7.4	11.2	0.88	0%	11.2%
Calan Healthcare Properties Trust	CHP	16.2	15.4	0.56	29%	8.0%
Capital Properties New Zealand Ltd	CNZ	19.4	18.5	0.52	42%	7.2%
Kiwi Income Property Trust	KIP	16.4	16.4	0.40	24%	7.0%
Macquarie Goodman Property Trust	MGP	19.6	30.6	0.36	17%	7.0%
National Property Trust	NAP	17.7	18.7	0.64	53%	7.8%
Property for Industry Ltd	PFI	10.6	11.2	0.40	24%	7.1%
Trans Tasman Properties Ltd	TTP	9.8	8.1	0.62	49%	8.2%
						7.4%
Finance & Other Services						
Abano Healthcare Group Ltd	ABA	30.2	-67.8	1.90	57%	12.3%
Metlifecare Ltd	MET	21.3	19.7	0.92	17%	10.5%
Ryman Healthcare Ltd	RYM	20.9	20.5	0.38	10%	7.3%
Taylor's Group Ltd	TAY	9.6	14.2	0.39	9%	7.4%
Waste Management NZ Ltd	WAM	15.5	24.4	0.85	14%	10.2%
						9.5%
Textiles & Apparel						
Cavalier Corporation Ltd	CAV	8.3	11.6	0.45	14%	7.6%
Pod Ltd	POD	9.1	12.9	0.95	26%	10.4%
						8.1%
Transport						
Air New Zealand Ltd	AIR	12.7	9.1	1.79	49%	12.1%
Mainfreight Ltd	MFT	23.6	54.4	1.05	24%	10.9%
Owens Group Ltd	OWN	-8.8	-9.6	0.43	18%	7.5%
Toll NZ Ltd	TRH	-2.7	-1.9	1.39	31%	12.1%
						11.9%
Overseas						
Guinness Peat Group Plc	GPG	18.1	28.4	0.49	10%	8.0%
BIL International Ltd	BRY	17.3	21.2	1.45	41%	11.4%
Lion Nathan Ltd	LNN	14.9	23.3	0.40	26%	7.0%
						8.2%

Market Weighted Average
10.3%

weighted outcome there is an equal probability that they will be above or below the probability weighted cash flow. There is no bias towards downside outcomes. The investor is exposed to volatility of cash flows above or below the probability weighted outcome.

It is not often that we see true probability weighted cash flows being determined for evaluating a project. It is often argued, with some justification, that estimation of all possible cash flow permutations is difficult, and hence the short cut of adjusting the discount rate is used. What is supposed to be an expected cash flow will be a point estimate of the likely, or perhaps best, outcome and the discount rate will be adjusted upwards to recognise the possibility that actual results may fall short of the forecast. This is implicit recognition that the cash flow forecast does not adequately capture all downside risk.

Adjusting the discount rate for perceived risk requires an arbitrary judgement or rule of thumb. Justifying this can be difficult. It also removes the important discipline of carefully assessing and analysing the actual risks that the business will face and how these will impact on cash flows.

Changing the discount rate can change the relative ranking of projects. The sensitivity of an NPV calculation to a change in discount rates will depend on the profile of the cash flows. It is not hard to produce simple but realistic NPV calculations that show the relative ranking of two projects reversing as the discount rate is increased above a theoretical cost of capital. This outcome is particularly relevant to the capital rationing justification for setting hurdle rates.

Organisations often have an abundance of projects but limited resources to invest. In theory, any projects that have a positive NPV, using the opportunity cost of capital, should add value to a business. A business should be able to raise capital to invest in such projects. To suggest otherwise implies that our capital markets are imperfect.

However, notwithstanding the theory, many organisations have real capital constraints. While these constraints are often self imposed by the business owners, for example because they may not have capital to invest themselves and are not prepared to let other equity investors provide capital, they are nevertheless real for managers to deal with.

Increasing the discount rate used to calculate the NPV of projects being evaluated is one approach to dealing with this. All other things being equal, this will have the effect of reducing the value of future cash flows and so make it more difficult for projects to show positive NPVs. If the discount rate is set high enough, the number of positive NPV projects will reduce. It would be entirely feasible to set the discount rate at a level so that the amount of positive NPV projects matches the amount of available capital.

While this approach achieves an end, it does have some risks. As noted above, raising the discount rate will impact some projects more than others. This is a problem because it will distort true relative values and could lead to suboptimal outcomes. More valuable projects at the true cost of capital could be discarded as the discount rate is increased.

The choice of discount rate to be used in NPV analysis does matter. The default position should be to use an opportunity cost of capital applied to a probability weighted cash flow forecast. There may be a view that this approach will not lead to a satisfactory outcome because of the likelihood that the cash flows will not adequately factor in risk. Solving this problem by increasing the discount rate is easy but crude. A better response is more focus on analysis of the cash flows and their underlying drivers.

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Disclaimer: The Cost of Capital Report is intended as an overview of WACC as at 31 March 2005. Readers are advised that before acting on any matter arising in this report, they should consult PricewaterhouseCoopers Corporate Finance.

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