

# Principals of corporate finance



**Introduction**

The question of whether or not to proceed with a project requiring significant capital expenditure is one which involves considerations running the gamut of issues facing the firm. Taking a purely financial perspective the firm is required by Fischer's Separation Theorem to return the maximum amount of wealth to shareholders (Fischer, Reprinted 1977). In the modern firm ownership is separated from control in the form of the capital of the company being held, traditionally at least by shareholders who have little to do with the day to day running of the firm, this being entrusted to the Directors appointed to the board by the trustees and shareholders. As such in the modern finance world there is a considerable agency problem whereby the owners of the firm's capital have a degree of separation from the control of their capital (Fama, 1978). As such it is expected, and enforced by the market in terms of the willingness of investors to place capital under a firm's control, that a firm will return wealth commensurate with an acceptable degree of risk. Indeed it is the risk of an investment which defines the importance of investment appraisal in firms and understanding the difference between systematic and un-systematic risk underpins much of the following discussion of the investment appraisal process (Hirshliefer, 1961).

Un-systematic risk is the risk associated with the unique operations and conditions of the firm and is relatively unimportant (at least in terms of the financial theory) whilst systematic risk, especially as represented as the Beta of the firm (more of which later) is the risk of the class of share within the market (Pogue, 2004). The theory is that a share price is determined by its relation to the capital market line, in terms of the random walk theory, which

governs the movement of the share with the market. Shares move as the market moves, generally speaking, and so how much they move represents the systematic risk to the shareholder. Beta is now one of the most common ways to measure the value of equity capital and is also used heavily in portfolio theory. It is not without controversy or criticism. Betas are worked out using a wide range of financial data from the past and as such many commentators have argued that Beta has little to tell us about the future. There are significant problems with translating accounting data into price relevant information, particularly there is at best a tenuous link between earnings and book values of assets and prices observed in the market. Particularly the Ohlson model which it is argued demonstrates a coefficient between these figures and price (also which it is assumed makes sense of both the Modigliani and Miller relevancy hypothesis and Gordon and Shapiro's value metrics) (Pogue, 2004). Notwithstanding these criticisms and the accepted criticism of the random walk theory, which are considerable, Beta is still widely accepted as a way of dealing with systematic risk.

What does this mean for Investment Appraisal techniques? In terms of the accepted methodology of investment appraisal the goal of such appraisal has to be the increase in wealth of the shareholders, and as such many of the techniques which are readily deployed by managers have no theoretical basis. In the following appraisal of the project a number of techniques are used to give decision relevant information of the project (Graham, 2001). The company has two criteria which it uses to judge the acceptability of a project, the Return on Investment, which it states must be above 15% and

the payback period, which must be within three years. Both of these methods give information in terms of in the first case, accounting data, and in the second a rule of thumb for recouping the initial investment within a specified time period. Neither of these methods tell us much about the financial and wealth creating aspects of the project in question (Hajddasinski, 1993). Payback is simply a measure of the amount of time it takes to recoup the initial investment, and as such has little to do with maximising shareholder wealth, it is entirely possible for a project to recoup the initial investment very quickly but then go on to actually destroy wealth in later years, particularly when a project runs for a significant period of time. The Accounting rate of return similarly tells us little about the wealth creation of the project, considering as it usually does non financial items such as depreciation which have little to do with the amount of actual wealth returned to shareholders. Neither of these techniques takes into consideration systematic risk to shareholders, and as such ignores an important and fundamental aspect of modern finance theory. Indeed it is only Net Present Value (NPV) which can tell us about the wealth creating and destroying aspects of a project and as such it is this technique (along with the similar technique of Internal Rate of Return (IRR)) which can give decision relevant information in terms of shareholder wealth (Lefley, 2004). Briefly NPV uses a discount factor, based upon the Weighted Average Cost of Capital (WACC) which adjusts the incremental net cashflows of a project for systemic risk, thus ensuring that the wealth created for the company reflects the time value of money (Amran, 1999). Much of the methodology in NPV requires one to recognise incremental cashflows and to remove those which have no relevance to wealth creation, particularly accounting derivations

such as depreciation. Other cashflows which need not be included are sunk costs and other costs which would exist regardless of the projects acceptance. Thus the analysis concentrates on the wealth creating (or destroying) aspects of projects rather than the book conventions and ephemeral of other techniques. It results in a cash figure, in terms of either wealth added or destroyed by the acceptance of the project and is particularly useful for the ranking of projects in times of capital rationing. NPV is a powerful decision making tool, but not without considerable problems in and of itself. NPV requires the firm to estimate future cashflows, and as will be seen, the accuracy of these cashflows are of significant importance to the viability of the project (Amran, 1999). Further the use of NPV is considered by many to be far more complex than most other techniques and non specialists may find the results and even the preparation of this analysis to be a significant challenge. Further the discount factor itself is often controversial, WACC is only one of a range of factors which can be used, but is most theoretically correct (as will be seen in the discussion later of the capital gearing theory), but without a very accurate discount factor the analysis is at serious risk of error (Hillier, 1963). Notwithstanding these problems NPV is one of the most relevant and reliable tools of investment appraisal and satisfies much of the theoretical underpinning of the subject of finance. This report finds that the project returns a positive NPV and satisfies all of the other investment criteria and therefore should be undertaken (Graham, 2001).

## **Results & Findings**

Please see appendix A for the full derivation of the results and findings.

Net Profit (£)	279200 9
Payback	2.5 years
ARR%	55. 84018
NPV	176778 5
IRR	21%

This is based on a cost of equity capital of 6% which in turn is based on the calculation for Equity Capital under the Capital Asset Pricing Model (CapM):

Where  $K_e$  is the cost of equity capital,  $r_f$  is the risk free rate (often gilts)  $\beta$  is the assigned Beta of the share and  $r_m$  is the market risk. For the company this equates to 5.31% which has been rounded up to the nearest whole (under the assumption that it is better to err on the side of caution)

### **Discussion and Analysis**

As has been established in the introduction the primacy of the NPV technique carries with it a significant theoretical advantage over other methods. IRR too is based on the same methodology and gives the cost of capital at which the NV of the project would be zero, as such it provides for the maximum cost of capita at which the project would be viable. It would seem that this project is worth undertaking, not only does it satisfy all of the existing

criteria for the firm, but it also returns wealth to the shareholders given the risk class of the share. The problems of NPV have to, however, be considered in line with the predictability of cashflows and the sensitivity of the project to the accuracy of these cashflows (Kim S. H. & Crick, 1986). If the cars per day through the toll booths were a thousand less the project returns a negative NPV and in effect destroys wealth for shareholders:

Time	0	1	2	3	4
Income					
- Vehicles (Est) p/day	0	2000	1400	1200	1000
- Toll p/car (£)	0	4	5	5.5	6
- Income p/day	0	8000	7000	6600	6000
- Income p/annum	0	292000	255500	240900	219000
		0	0	0	0
Expenditure					
- Operating costs (@£ p/vehicle)	0	2	2.5	3	3.5
- Total Operating costs	0	146000	127750	131400	127750
		0	0	0	0
- Wages (@£288 p/day *	0	105120	105120	105120	105120

365)					
- Outlay	500000 0				
Total Expenditure	500000 0	156512 2	138262 3	141912 3	138262 4
Net Income	- 500000 0	135487 8	117237 8	989877	807376. 5
Net Profit	- 675491				
ARR%	-13. 5098				
Discount @ 6% (Cost of Equity Capital)		0. 942	0. 888	0. 8375	0. 7903
DCF	- 500000 0	127629 5	104107 1	829022	638069. 6
NPV	- 121554				



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As wages are fixed this cost is not sensitive to change, but other costs may be, if operating costs rise by 50% then the project also destroys wealth:

Time	0	1	2	3	4
Income					
- Vehicles (Est) p/day	0	3000	2400	2200	2000
- Toll p/car (£)	0	4	5	5.5	6
- Income p/day	0	12000	12000	12100	12000
- Income p/annum	0	438000	438000	441650	438000
		0	0	0	0
Expenditure					
- Operating costs (@£ p/vehicle)	0	3	3.75	4.5	4.75
- Total Operating costs	0	328500	328500	361350	346750
		0	0	0	0
- Wages (@£288 p/day * 365)	0	105120	105120	105120	105120

- Outlay	500000 0				
Total Expenditure	500000 0	339012 3	339012 4	371862 5	357262 5
Net Income	- 500000 0	989877	989876 . 3	697875 . 5	807375. 3
Net Profit	- 151499 6				
ARR%	-30. 2999				
Discount @ 6% (Cost of Equity Capital)		0. 942	0. 888	0. 8375	0. 7903
DCF	- 500000 0	932464 . 1	879010 . 1	584470 . 7	638068. 7
NPV	- 196598				

	6				
IRR	-14%				

In both these scenarios the changes to the cashflows has a devastating effect on the viability of the project, one which is not communicated adequately (especially in terms of the costs) by ARR, or even payback. Imagine not quantitative factors that may cause these scenarios to happen. Drivers believe that the price of the toll is too high and find alternative routes to avoid paying the toll. In the case of costs hikes in energy prices or other operating costs could easily impact on the viability. These quick examples demonstrate the dangers of making assumptions about the future, and as such one must be very careful about the assumptions made in cashflows. One way of adjusting for these unsystematic risks is to conduct sensitivity analysis, and to use statistical techniques to adjust the NPV, this is often termed Expected Net Present Value (ENPV) and uses standard deviation to adjust for risk. Further the cost of capital is a significant factor in the reliability of NPV (Pogue, 2004). Herein the cost of equity capital is used, as the firm is geared to all equity this is probably a realistic cost of capital, but perhaps investors see the direction of the firm as particularly risky and require further compensation. Using WACC is only one option for managers and indeed the use of WACC does not always adequately adjust for the risk seen as inherently bigger as cashflow move forward in time. Consideration needs to be given to the discount factor used.

Lastly, and in particular reference to the WACC it is important to consider the nature of the capital structure of the company (Harris, 1991). Capital

structure generally refers to the mixture of debt and equity which goes to make up the capital of the company, known as gearing, and represented as a proportional ration. Assume that the company has £5, 000, 000 of equity, as is stated, in the form of equity and has no debt. As this is a large capital project the company is faced with a decision as to how to finance the project. Assuming that the only options are a rights issue to generate more equity or debt (in the form of debentures, typical of long term borrowing) then a decision needs to be made as to which course is better for the company as a whole. Gearing is another contentious issue in finance with no correct answer to the problem of optimal gearing. A number of theoretical approaches can be applied to the problem, most notably the work of Modigliani and Miller (MM) and their irrelevancy propositions (Modigliani, 1958). To understand this, it is important to understand a number of features of both debt and equity. Equity as has been said is governed by the risk it represents for equity holders, often in the form of Beta, Debt is not governed by this and is rather a cost in terms of the interest payments over the life of the debenture and the repayment of the capital sum at the end of the loan. Therefore Debt is often cheaper than equity as the risk is considered lower than that of a shareholder. If one thinks of an Income Statement from a set of accounts, one can clearly see that Interest is payable regardless of the profit attributable to shareholders, in effect the bank gets paid first. Further there is a tax shield on interest payments, as these are a cost of the company and therefore reduce the amount of corporation tax payable. Therefore consider the following example. The company currently has £5m in equity and requires a further £5m to finance the toll booth project. It s cost of equity capital is 6% but it is able to borrow

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at 5% debentures, the rate of corporation tax is 30%. As it stands the WACC is 6% and if the company issues a further £5m to finance the project it will remain so, if however the company borrows the £5m the following holds:

	Debt	Equity
% Cost	5	6
Gearing	0.5	0.5
Wacc	5.5	

With a further reduction of  $(1-T)$  to represent the tax shield this figure becomes 5.15%, the cost of capital has been effectively lowered. This means that future projects (as it is important to use the existing cost of capital for investment appraisal regardless of how the project is to be financed for NPV calculations) will return more wealth to shareholders. The work of MM, however, pointed out that in a theoretically perfect world (no tax, symmetry of information and borrowing rates as well as other theoretical suppositions) the reduction is exactly offset by the increased risk from extending borrowing as follows:

(Source, G Arnold, Corporate Financial Management. 3rd Edition, London: Prentice Hall)

Therefore there is an increase of risk to equity shareholders with the i