A New Approach To Corporate Borrowing

By
C. WILLIAMS, E. L. & C. Baillieu
G. HOPKINS, A. & N.Z. Bank

This article is based on a paper presented at the Residential School in Investment Management, New England University, Armidale, N.S.W., in January, 1966. The aim of that paper was to explain and comment upon proposals by Assoc. Professor Gordon Donaldson, which were published four years ago in the Harvard Business Review(1).

As a result of discussion and criticism at the School, there have been substantial changes in content and emphasis and the subject is now presented both for its intrinsic interest and as a particular example of the impact of new decision making techniques on financial management. Its relevance for security analysts lies in the fact that decisions on company capital raising are the chief points of contact between our profession and the company manager.

Professor Donaldson's Approach

Donaldson begins with a thorough look at the way in which borrowing decisions are now made. He offers some criticisms and ends by submitting an alternative technique which he believes to be more logical and more useful for the future.

After an extensive survey of American companies,(2) he found that debt policies were arrived at in a number of ways. Some companies took the advice of institutional lenders or financial intermediaries. Others made comparisons with the practice of similar companies or followed their own past practices. Others again relied on the "generally accepted principles" of financial management. Whatever the method, the resultant policy was usually expressed in terms of asset cover or earnings cover.

He finds this technique unacceptable on a number of grounds. The decision to incur a debt is essentially a decision by management to increase the risk of insolvency for the sake of capital which is cheaper than equity, thus conferring a benefit on the shareholders. It is, therefore, up to directors (not outsiders) to make this decision in the light of their own company's likely circumstances during the currency of the debt.

Such a decision cannot be adequately expressed in terms of assets cover. Book values of assets do not necessarily represent present realities and a surplus of book assets is no guarantee of solvency. Earnings coverage provides a slightly better indicator, but an accounting net profit is not the same as a cash surplus, particularly in a period of recession. Besides, what degree of coverage is safe?

Donaldson's alternative suggestion follows from his description of debt as cheaper but riskier than equity. A logical choice demands a measure of the risk which will result from a particular amount of debt. The nature of the risk is insolvency—running out of cash—and the most likely time for this to happen is when sales decline in a period of recession.

Accordingly, he recommends a detailed analysis of likely cash flows during a recession, with the aim of setting a maximum favourable limit and a maximum adverse limit to the behaviour of each factor and, consequently, to the cash position as a whole. Armed with these estimates, management can then see the effect of incurring a specified level of debt, or any other fixed cash commitment.

Probabilities must now be introduced. Management may consider that a 20% fall in sales is more probable than a 15% fall or a 25% fall. If this is the case, odds may be assigned so as to reflect this belief. By carrying out the process for each factor affecting cash flow and by making some calculations, it should ideally be possible to arrive at a final estimate that the odds of insolvency with the specified level of debt are (say) one in twenty. This provides the measure of risk necessary to an informed decision.

Donaldson quickly admits that this technique requires considerable effort in gathering the data and a degree of expertise in processing it. Indeed, he suggests as an alternative, calculation of the maximum and most probable adverse limits only. However, he believes that the importance of an optimum debt policy and the usefulness of the data for other purposes will often justify the expense of a full analysis.

In particular, he believes that there is both a need and an opportunity for a better technique. Fading memories of the Great Depression and confidence in today's economic regulators are, in his view, leading to increased reliance on debt capital in the U.S.A.

The Australian Scene

We begin our commentary by setting out some figures on Australian trends in money-raising (Table A).

The table shows a sharp increase in debt financing, both relatively and absolutely, in the years 1958-60. The subsequent recession, with its associated over-capacity and large corporate failures reversed the

trend, while tight liquidity and high interest rates had a marked effect in 1964/65.

Our surmise is that two contradictory tendencies are now at work. On the one hand, businesses which operate in unstable or cyclical industries are more cautious in their approach to debt. On the other hand, large companies in basic industries are gearing up their equity to a modest degree. Both groups might be expected to have a strong interest in more precise measurement of debt capacity.

New Demands on the Security Analyst

It is, therefore, our expectation that security analysts who deal with capital raising problems will shortly be faced with borrowing propositions backed up by the sort of predictive calculations which Professor Donaldson describes.

In these cases the analysts will be required to form some judgment on the credibility of the forecasts and the soundness of the conclusions drawn therefrom. But in particular he will have to assess whether the proposed financing arrangements will indeed produce the advantages which the borrower expects of them. This does not mean that he will be usurping the functions of management. As Donaldson points out, it is up to directors to decide what degree of risk an enterprise should incur, but the assessment of risk and the calculations of the likely rewards of running that risk should be the concern of both the borrower and the lender or intermediary whom he consults.

The remainder of this paper will deal with the tools available to the analyst in this situation.

Forecasting

Although Donaldson's article lays some stress on the problems involved in his approach to debt policy, we think that the difficulty in forecasting future cash flows has escaped rather lightly. One cannot, for instance, make a usable prediction about the behaviour of cash flows in a recession, unless the pre-recession situation is described. This, in turn, requires forecasts back along the time scale to the present. In short, what is involved is nothing less than a total forecast of items involving cash outlays to the limit of management's horizon.

While this may seem an impossible demand, it should be remembered that a medium to large company will not normally undertake a substantial capital investment programme without making a detailed rate of return analysis, and this will provide much of the material required for a concurrent analysis of debt capacity. As an example, one might take a recent article on investment decisions[3], which lists the following among key input factors in a typical capital investment problem:

1. Market size.
2. Selling prices.
3. Market growth rate.
4. Share of market.
5. Operating costs.
6. Fixed costs.

All these, stated in cash terms, would be equally relevant to the debt capacity decision.

A further source of complication is the varying degree of interdependence between the items which make up cash flow, but this must be determined as well for investment planning as for the financing problem and it can be solved by a process known as factorial analysis.

Coming to the vital recession period itself, there are three major requirements—

1. A clear definition of the recession in terms of length and depth of decline in sales and changes in other factors.
2. Prediction of management reactions to the recession.
3. Prediction of the response to management's decisions.

Historical experience may be the best guide here, but it is essential that the points at which management will react are laid down quite clearly, to prevent any cheating by the omniscient forecaster.

Probabilities and Simulation

Given a range of forecasts covering each of the factors affecting cash flow, Donaldson invites us to attach a measure of probability of occurrence to each estimate within those ranges.

The article on investment decisions previously referred to[4], shows how this may be done and explains the way in which the factors may be combined to give a detailed picture of the probable outcomes without endless calculation. The same methods may be used to introduce a recession at various points of time in the simulation exercise. In this way the overall likelihood of insolvency may be determined.

The Rewards of Debt Capital

The whole approach which we have outlined depends on the assumption that debt capital is cheaper than equity. This assumption must now be examined and refined, since management can hardly be asked how it feels about specific risk alter-

Table A.

NEW MONEY RAISINGS BY LISTED NON-FINANCE COMPANIES 10-YEAR PERIOD 1/7/1955 TO 30/6/1965

($ million)

Year ended June	Ordinary and Preference Share Capital	Debentures, Notes, Loans and Deposits Amount	% of Total	TOTAL
1956	97.8	47.4	33	145.2
1957	84.0	44.0	34	128.0
1958	62.6	67.4	52	130.0
1959	76.4	101.4	57	177.8
1960	76.4	115.8	60	192.2
1961	156.6	118.0	43	274.6
1962	140.4	109.0	44	249.4
1963	93.0	76.6	45	169.6
1964	107.0	72.2	40	179.2
1965	134.2	48.6	27	182.8
	1028.4	800.4	44	1828.8

Source—Commonwealth Statistician.

natives, unless it knows the rewards attaching to each risk-bearing decision.

We begin with some propositions about the effect of gearing on earnings per ordinary share.

(1) Where a company has a known total capital requirement and a fixed proportion of borrowing there is a straight line relationship between rate of return on total assets and earnings per ordinary share at any given interest rate. If the proportion of borrowings is increased, the slope of this straight line is higher. In practical terms this means that choice of a gearing rate determines the rate at which earnings per share will respond to a change in the earning rate on total assets. In other words, risks and the chance of higher rewards are increased by raising the gearing ratio.

(2) In the example above, how do the risks and rewards increase with gearing?

The graphical example gives the answer: in a fixed total funds, fixed interest rate and rate of return model, the earnings per share / borrowing relationship is a hyperbolic curve. For each unit increase in debt (and unit decrease in share capital) earnings per share increase at a successively higher rate. The graphical example shows that risk increases in a similar way.

(3) Earnings per share decline linearly as the interest rate on borrowings increases.

(4) Take an existing firm with a given capital structure which is planning expansion. If the earning rate on new money is the same as on existing funds, and interest rate on borrowings is unchanged, earnings per share may be increased linearly by financing expansion by debt alone.

(5) Finally, we assume that the assets to be acquired in an expansion programme will earn at some rate different from the rate earned on present assets. Once again earnings per share increase linearly with debt, but the slope of the line is determined by the relationship between the expected earning rate and the interest rate on borrowings.

This suggests that *shareholders* will always benefit, provided that their company earns more on its new assets than the interest rate on the capital used to acquire them.

The Cost of Capital — Two Theories

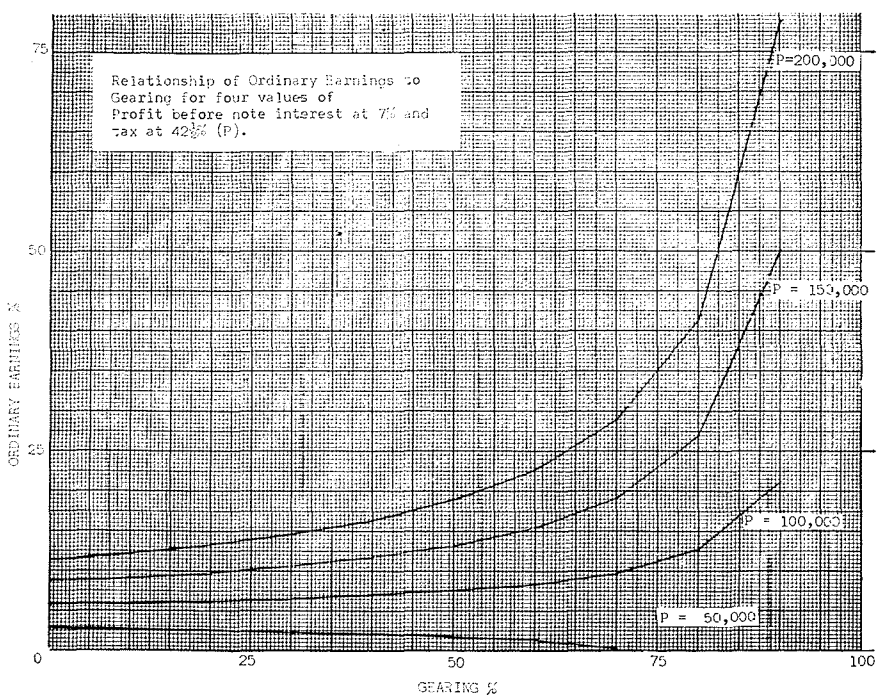
Unfortunately this is not the whole story. As an Australian writer[5] has recently put it "the real cost of a security comprises its own yield plus the induced added cost of the company's other securities". In other words, investors may require a lower Price Earnings ratio from a highly geared equity than from one with little or no gearing. If the P/E ratio of a share is regarded as a measure of the cost of raising additional equity capital, it becomes clear that this factor must also be taken into account.

There are two main schools of thought on the subject. What may be called the traditional school maintains that up to a certain point the risks arising from increased gearing are negligible and the market will maintain the P/E ratio at its earlier level. Since the increased borrowing will have raised earnings per share, market price will increase, the cost of equity finance will remain unchanged and the weighted average cost of capital will therefore fall.

Beyond this range of gearing increasing risk will induce a fall in the P/E ratio and hence a rise in the cost of equity capital. There comes a point when further amounts of "cheap" debt no longer reduce the weighted average cost of capital and it begins to rise. The mix of debt and equity at this point represents the optimum financial structure for the company.

The essence of the rival theory [6] is that investors *will* rather than *may* require a lower P/E ratio from geared up equity, *no matter what the gearing.*

Given a perfect capital market with no taxes or transaction costs, it is argued that a shareholder can



arrange for himself whatever gearing he prefers. If he holds shares which are too highly geared for his tastes, he may sell some of them and invest in fixed interest securities of an equal value.

To take an example, suppose a company has the following financial structure—

Capital	
Ordinary	100
Long Term Debt	100
	200
Earnings	
Earnings for Ordinaries ..	10
Interest	5
	15

An investor holding 10 units of ordinary capital may wish to neutralise the gearing which the company has arranged. Assuming that the market price of each unit is equal to its nominal value, he may do this by selling five share units and buying five debt units. His risks and his income are then just as they would be if the company had no debt at all.

Investor's Share of Revenue

Ungeared situation
10 shares @ 7½% = .75
Actual
5 at 10% + 5 @ 5% = .75

Conversely, the investor may increase the gearing of his personal portfolio, either by selling debt securities if he has them or by borrowing money to buy shares if he has not.

From the company's point of view, this argument has some interesting consequences. Since investors may arrange their own gearing, companies will be ranked not by the earnings yields of their ordinary shares but by the revenue-price ratios of their total capitalisation (shares plus debt).

Thus if we describe this revenue-price ratio (which is assumed to be constant) as k:

$$k = \frac{rF}{mC + B} \qquad (1)$$

where rF is the company's earnings before deduction of interest, mC is the market value of its share capital and B is the amount of its borrowings.

If we now represent earnings per unit of market value of ordinary capital as E:

$$E = \frac{rF - iB}{mC} \qquad (2)$$

Rearranging equation (1) to read—

$$rF = kmC + kB$$

we substitute for rF in (2) as follows—

$$E = \frac{kmC + kB - iB}{mC}$$

$$= k + \frac{(k - i)\,B}{mC} \qquad (3)$$

It can be shown that earnings per unit of *market* value of ordinary capital will increase linearly with the amount of borrowing. Consequently, a company will not reduce its cost of capital by raising money through debt rather than equity, since share investors will require progressively lower Price Earnings ratios to compensate them for the risks of gearing.

Furthermore, it can be shown that under these conditions shareholders will be worse off if their company invests in a project which has a rate of return r′ is less than k, even if it borrows at rate i is lesser than r′ to finance the project. This contradicts what we had apparently proved by Example (5) in Appendix.

These theoretical exercises must now be related to the problem in hand. If we assume that the risk attaching to a debt financing decision has been measured, the analyst must be prepared to answer the question, what is the reward for incurring this risk?

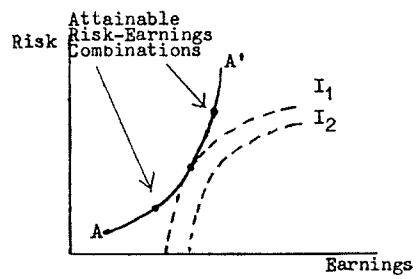
There are two parts to this question. First, what effect do we expect this borrowing to have on earnings per share? Secondly, what reward, if any, will the shareholders derive from these increased earnings. The first can be answered by simple arithmetic. The second, as we have tried to show, is much more difficult and is further complicated by such things as transaction costs, taxation differences and changes in market conditions.

We have no easy solution to offer, although we note Barton's conclusion that the traditional theory seems to fit Australian conditions better than the Modigliani-Miller hypothesis. As a final caution, we note that the effect of present decisions on future financing plans must be considered. If this is not done, and propositions are accepted simply because they will earn more than their particular financing costs, serious mistakes may be made[7].

Risks and Earnings

Supposing some way has been found to evaluate both the risks and rewards likely to flow from borrowing, how is the decision to be made? A technique which seems to have possibilities is that devised by Markowitz for selecting a portfolio of securities[8].

He begins by compiling an index of expected earnings and an index of risk. For each security he estimates anticipated future earnings and calculates a rough figure for the standard deviation of those earnings, thus giving him the raw material for his indices. By using programming methods, he then calculates what portfolio, chosen from these securities, will have the lowest risk for any given level of anticipated earnings. The line joining these optimal points on a graph such as the one below is called a risk-earnings possibility curve. (A - A')



Having done this, one must then draw a risk-earnings indifference map (the I curves in the diagram).

As will be seen, the curves presuppose that, other things being equal, human beings usually prefer lower levels of risk, and as risk increases, they require higher levels of earnings to keep them indifferent.

The question which naturally arises is, whose indifference map do we draw? As Donaldson points out, directors ought not simply to follow their own inclinations in this matter. Yet shareholders would have many different views and no one decision will please them all. Among the numerous unsolved questions, this is perhaps the most difficult.

Conclusion

It may seem that the measurement of risk in borrowing decisions creates more problems than it solves, but we do not think this is so. In truth, the problems are inherent in most capital raising proposals, especially where a company is more highly geared than is customary. All that Donaldson's technique does is to bring these issues to the surface, where they demand an answer.

We believe that security analysts with a thorough understanding of this approach can contribute much to finding those answers.

FOOTNOTES

(1) New Framework for Corporate Debt Policy, Harvard Business Review, March-April 1962.

(2) Corporate Debt Capacity (Boston, Division of Research, Harvard Business School, 1961).

(3) Risk Analysis in Capital Investment, David B. Hertz, Harvard Business Review, January-February, 1964.

(4) Hertz, op. cit.

(5) The Cost of Capital of Australian Retail Companies. A. D. Barton—(The Australian Accountant—November 1965).

(6) Franco Modigliani and M. H. Miller—"The Cost of Capital, Corporation Finance and the Theory of Investment in E. Solomon (ed.), The Management of Corporate Capital (The Free Press of Glencoe, New York, 1959). Apart from the exposition in Barton's article, there is a straight-forward account in W. J Baumol, Economic Theory & Operations Analysis (2nd ed.) (Prentice-Hall, Inc., Englewood Cliffs, N.J. 1965).

(7) Basic Business Finance, Text and Cases, Hunt, Williams and Donaldson (rev. ed.). (Richard D. Irwin, Inc., Homewood, Illinois, 1961. P.624.).

(8) This approach is described in Baumol, Op. cit. P.457.

APPENDIX

The fundamental equation

$$Y = \frac{rF - iB - t\,(rF - iB)}{C} \qquad (1)$$

Where F — total funds
C — paid (ordinary) capital
B — long term borrowings
r — rate of return on total funds (gross)
i — interest rate on borrowings (gross)
t — rate of taxation
Y — earnings per share
$r > i$ and $t < 1$.

The company is assumed to have no current liabilities or reserves (hence $F = C + B$) and each share has a value of 1.

Example 1.

Relationship between rate of return on total assets and earnings per ordinary share

Rewrite equation (1) as

$$Y = \frac{F\,(1-t).r}{F - B} - \frac{iB\,(1-t)}{F - B} \qquad (1A)$$

This is now recognizable as the equation of a straight line whose gradient is $\frac{F\,(1-t)}{F - B}$

If B is increased this reduces the denominator of this expression and hence increases the gradient.

Example 2.

Relationship between gearing and earnings per ordinary share, total funds remaining constant.

Rewrite equation (1) as

$$Y = (1-t)\,\frac{rF - iB}{F - B} \qquad (1B)$$

Then, when $B = 0$, $Y = r\,(1-t)$
and as $B \to F$, $Y \to \infty$

Thus constituting one section of a hyperbola.
Since $F > B$ by definition, the other section may be disregarded.

Example 3.

Relationship between interest rate on borrowings and earnings per ordinary share.

Rewrite equation (1) as

$$Y = \frac{-B\,(1-t).i}{F - B} + \frac{rF\,(1-t)}{F - B} \qquad (1C)$$

Hence there is a linear relationship between Y & i with gradient

$$-\frac{1-t}{\frac{F}{B} - 1} = \frac{1-t}{1 - \frac{F}{B}}$$

which is negative since $t < 1$ & $B < F$.

(Continued on page 12)