Chapter 23
FROM THE COST OF EQUITY TO THE COST OF CAPITAL

Mirror, mirror on the wall . . .

Determining the cost of capital, or the weighted average cost of capital, is not a simple task, but it is one of the fundamentals of finance. The cost of capital has to be factored into investment decisions because it is the rate that is used for discounting cash flows for NPV or comparing with the IRR. Cost of capital is also used to determine enterprise value (see Chapter 32). Truly, its importance can hardly be understated.

But before reading on, it is imperative to understand the distinction between cost of capital, which is the weighted average cost of the capital contributed to the firm, and the cost of equity, which is just one component of the weighted average of the cost of capital.

Section 23.1
THE COST OF CAPITAL AND THE RISK OF ASSETS

The cost of capital is the minimum rate of return on the company's investments that can satisfy both shareholders (the cost of equity) and debtholders (the cost of debt). The cost of capital is thus the company's total cost of financing.

When markets are in equilibrium, any investor with a perfectly diversified portfolio holds a fraction of both the company's equity and its debt. This is known as the CAPM, as was discussed in Chapter 22. In other words, each investor holds a share of the company's operating assets, since this is equal to the sum of equity and net debt. Accordingly, each investor has some exposure to the risk arising from the company.

The cost of equity required by investors thus depends on just one factor: **the risk arising from the assets-in-place**. This means that the cost of the company's financial resources – its cost of capital – is none other than the rate of return required by investors, which is a function of the risk on capital employed.

The cost of capital depends solely on the risk of the assets-in-place, specifically its systematic risk, since unsystematic or specific risks are not remunerated.

The cost of capital is thus shaped by the economic characteristics of each sector of activity. It rises when fixed costs are high or the business is cyclical, and falls when the business operates more on variable costs or is easily predictable.

Modigliani and Miller (1958, 1977)[1] were the first to state that the company's cost of capital is not a function of its capital structure (see Chapter 33). If the risk on capital employed is such that it requires a 12% rate of return, and if it is fully equity-financed, shareholders will expect a minimum 12% return. On the other hand, if it is fully debt-financed, creditors will again require a 12% rate of return since they incur the same risk with the operating assets as the shareholders in the previous example. Lastly, suppose financing is *equally* divided between debt and equity. If the cost of debt is 10%, then shareholders will require a 14% return on equity to achieve a weighted average of 12%, i.e. the remuneration justified by the 12% risk for capital employed or the cost of capital.

Assume that in a perfect market the company changes its capital structure – for example, by buying back some of its equity via the issue of new debt. In this case, an investor with a perfectly diversified portfolio who holds 1% of the company's equity and 1% of its debt and thus 1% of its capital employed will continue to hold 1% of capital employed, though now with a lower amount of equity because of the share buyback and a higher % of net debt. The transaction is thus totally neutral for the investor. It will not affect the cost of capital, even if it is now divided between the cost of debt and the cost of equity, because the risk on capital employed remains unchanged.

As we have already discussed, the cost of capital is equal to the weighted average costs of net debt and of net equity. This will be examined in greater detail in the next section.

The cost of capital is not the weighted average of two separate costs. The overall riskiness of the company is represented by the cost of capital, whose two key components are debt and equity. The costs of equity and debt are a function of the risk of the assets, the cost of overall capital, and the respective weighting of each.

For purely practical reasons, however, the cost of capital is calculated by taking the costs of debt and equity together.

Section 23.2

ALTERNATIVE METHODS FOR ESTIMATING THE COST OF CAPITAL

The cost of capital can be calculated in three ways: directly, indirectly or via enterprise value.

1/ DIRECT CALCULATION VIA THE β OF ASSETS

Since a company's liabilities merely provide a "screen" between the asset side of the company and the financial market, the rate of return required to satisfy investors is equal to the risk-free rate plus a risk premium related to the company's activity.

Applying the CAPM gives us:

$$k = r_F + \beta_A \times (r_M - r_F)$$

where k is the weighted average cost of capital, r_F the risk-free rate, r_M the market rate of return and β_A the **beta of assets** or **unlevered beta**, that is the β of a debt-free company.

Just as the beta of a security measures the deviation between its returns and those of the market, so too does the beta of an asset measure the deviation between its future cash flows and those of the market. Yet these two betas are not independent. A firm that invests in projects with a high β_A – in other words, projects that are risky – will have a high β_E on its shares because its profitability will fluctuate widely.

	Asset beta
Food	0.43
Tobacco	0.52
Highways	0.53
Beer	0.59
Food retail	0.67
Non-food retail	0.68
Media/Advertising	0.74
Hotels	0.78
Consumer goods	0.79
Airlines	0.79
Software	0.91
Internet	0.98
Auto parts	1.00
Asset management	1.04
Real estate	1.07
Engineering	1.09
Temporary recruitment	1.10
Life insurance	1.28
IT (hardware)	1.67
All Sectors	**0.83[2]**

Source: BNP Paribas Corporate Finance, Business Valuation Team, June 2008.

[2] *This figure is lower than 1 since it is not the β of all shares on the market that average 1 but the β excluding the impact of net debt.*

The β_A can be easily computed knowing that it is equal to the weighted average of the β of equity and the β of debt:

$$\beta_{Asset} = \beta_{Equity} \times \frac{V_E}{V_E + V_D} + \beta_{Debt} \times \frac{V_D}{V_E + V_D}$$

β_A can also be expressed as follows:

$$\beta_{Asset} = \frac{\beta_{Equity} + \beta_{Debt} \times \dfrac{V_D}{V_E}}{1 + \dfrac{V_D}{V_E}}$$

β_D corresponds to the beta of the net debt and it should be computed exactly the same way as the beta of equity, which is by regressing the returns on listed debt against market returns of the debt of the same credit quality. However, it is reasonable to assume that

β_D is equal to zero for weakly-leveraged companies. Thus, the previous equation can be simplified as follows:

$$\beta_{Asset} = \frac{\beta_{Equity}}{1 + \dfrac{V_D}{V_E}}$$

We believe that it is not reasonable to simplify the analysis by assuming that $\beta_D = 0$ if the leverage of a company is not negligible. In fact, the higher the leverage the less the financial debt depends on the level of interest rates and the more will be linked to the specific characteristics of the company (fixed costs/variable costs) and its industry (cyclicality). In these cases, debt then begins to behave more like equity.
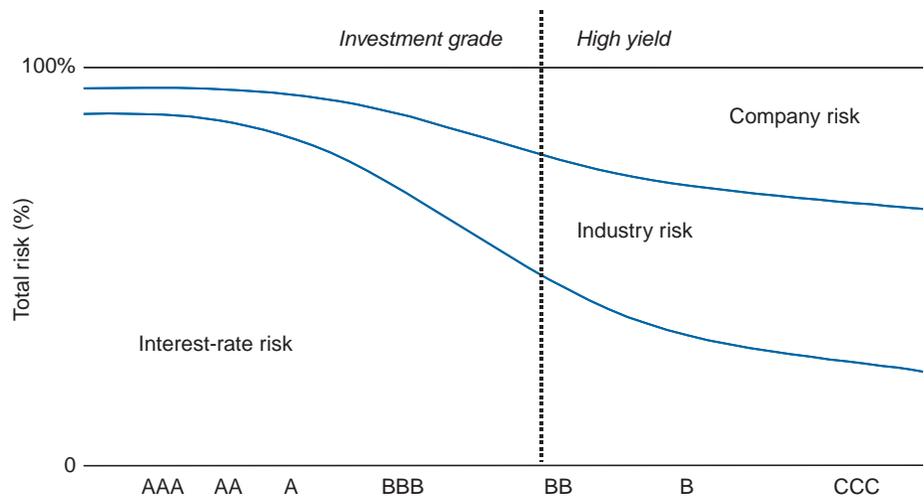
Often, our readers will read that financial analysts prefer using the following formula:

$$\beta_A = \frac{\beta_E}{\left[1 + (1 - T_C) \times \dfrac{V_D}{V_E}\right]}$$

This way of computing β_A assumes two strong assumptions, following Modigliani and Miller' (1963) propositions:
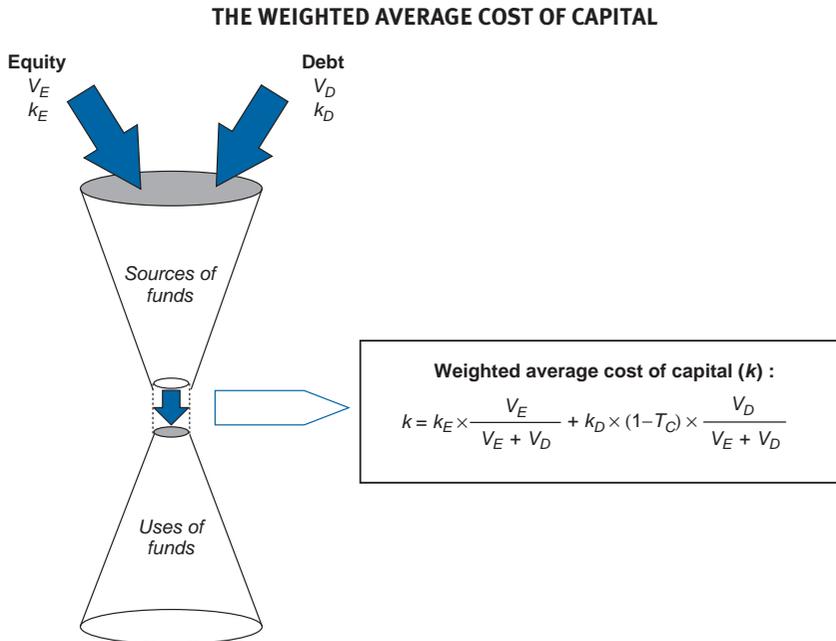
1   the company can borrow at the risk-free rate, whatever its capital structure is;
2   the value of the firm is equal to the unlevered value plus the value of the tax shield of debt, computed as the product of the net debt multiplied by the corporate tax rate.

Although these two assumptions are useful for simplifying the analysis, they are frequently unrealistic. The first, because even the borrowing rate of companies with AAA rating (e.g. General Electric) includes a credit spread. The second, because the financial

distress costs are not considered in the analysis, even if their magnitude is close to the value of tax shield for highly levered companies.

2/ INDIRECT CALCULATION

In practice, to determine the rate of return required by all of the company's providers of funds, it is necessary to **calculate the cost of capital by valuing the various securities issued by the company.**

THE WEIGHTED AVERAGE COST OF CAPITAL

Weighted average cost of capital (k) :

$$k = k_E \times \frac{V_E}{V_E + V_D} + k_D \times (1 - T_C) \times \frac{V_D}{V_E + V_D}$$

The cost of capital is related to the value of the securities and represents the amount the company would have to pay to refund all its liabilities, regardless of the cost of its current resources. As such, it symbolises the application of financial market logic to the corporation.

To calculate a company's cost of capital, we determine the rate of return required of each type of security and weight each rate according to its relative share in financing. This is none other than the WACC formula:

$$k = k_E \times \frac{V_E}{V_E + V_D} + k_D \times (1 - T_C) \times \frac{V_D}{V_E + V_D}$$

Thus, a company with equity financing of 100 at a rate of 15.7%, and debt financing of 50 at a pre-tax cost of 7%, has a cost of capital of 12% (with a 35% tax rate, T_C).

This is the most frequently used method to calculate the cost of capital. Nevertheless, beware of relying too much on spreadsheets to calculate the cost of capital, instead of getting your hands dirty by working on some examples yourself.

When performing simulations, it is all too tempting to change the company's capital structure while forgetting that the cost of equity and the cost of debt are not constant: they

are a function of the company's structure. It is all too easy to reduce the cost of capital on paper by increasing the relative share of net debt, because debt is always cheaper than equity!

In the preceding example, if the share of debt is increased to 80% without changing either the cost of debt or equity, then the cost of capital works out to 5.1%. **While the arithmetic may be correct, this is totally wrong financially.**

Do not forget that higher debt translates into a higher cost of both equity and net debt, as shown in the graph for food companies as of early 2008.
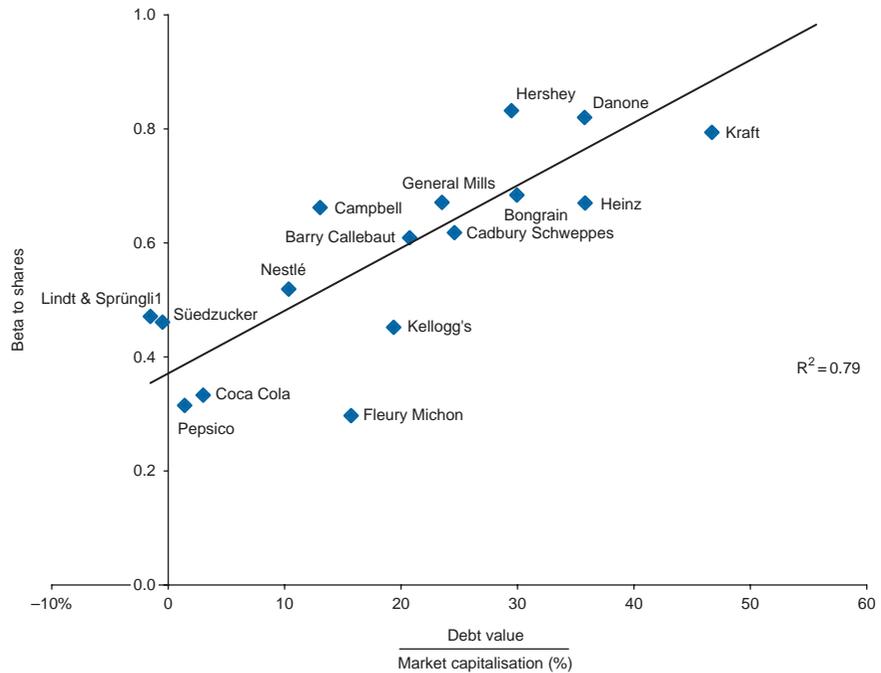
Source: Bloomberg, Datastream.

3/ THE IMPLICIT CALCULATION BASED ON ENTERPRISE VALUE

The cost of capital can be estimated based on enterprise value and a projection of anticipated future free cash flows, since:

$$V = V_E + V_D = \sum_{t=0}^{\infty} \frac{FCF_t}{(1 + k)^t}$$

It is then necessary to solve the equation with k as the unknown factor. However, this calculation is rarely used because it is difficult to determine the market consensus for free cash flows.

4/ THE PITFALLS OF THE INDIRECT COST-OF-CAPITAL CALCULATION

(a) Expected rate of return or effective rate of return?

The cost of capital is a financial concept reflecting the *expected* rate of return **required or expected** by investors at a given point in time. It is not an accounting concept and should not be confused with the *expost* return on capital employed, which is the **effective** rate of return.

Since it is not an accounting concept, the calculation of the cost of capital should be based on market rather than accounting data.

The cost of capital is neither an inverted P/E, nor the return on equity (r_E), nor the rate of return. Instead, it is the rate of return currently required by shareholders as measured by the CAPM:

$$k_E = r_F + \beta_E \times (r_M - r_F)$$

The cost of debt is not the cost of debt contracted 10 years, 1 year or 3 months ago. Nor is it the company's average cost of debt or the ratio of financial expenses to average debt for the year, as studied in Chapter 12, which covered the nominal cost of debt.

The cost of net debt is the rate at which the company could refinance its existing debt given its present economic position. It cannot be lower than the risk-free rate.

The tax savings generated by debt are represented by the factor $(1 - T_C)$ as applied to the cost of debt. Remember that cash flow was originally calculated at a marginal tax rate based on operating profit.

It is possible to estimate the rate at which the company can refinance its existing debt using two alternatives:

- use the official rating of the company. If the company has a rating given by one of the recognised rating agencies (Standard & Poor's, Moody's, etc.), the analyst should simply use the yield to maturity (YTM) required by financial markets at the time of the valuation for similar securities belonging to that class of rating; or
- create an implicit or synthetic rating. In the case where the company has not got an official rating, then the analyst proceeds by giving the company an **implicit** (or **synthetic**) **rating**. The idea is very simple (albeit difficult when applied!): the analyst tries to replicate the style of analysis performed by rating agencies in order to arrive at a reasonable approximation of the rating that the company could have received from such an agency. Once we have the implicit rating, the analyst uses the yield to maturity required on financial markets for the obtained class of rating. The reader should refer to our website for an exhaustive description of the process of implicit ratings.

(b) Accounting or market values of equity and debt?

Shareholders base their required rate of return on the market value of equity, that is, the amount at which equity can be bought or sold, rather than using book values. The same reasoning applies to debt holders.

> The choice of weighting is based on market values rather than book values.

This is consistent with the idea of selecting the required rate of return rather than the book rate of return. Using the book value of liabilities can be very misleading because it may significantly differ from the market value of equity and debt.

The yield to maturity shown in bond quotations in the financial press is based on the closing market price of a bond, not on its face value. Similarly, the implied cost of equity for a company's cost should be based on the market price per share at which it trades.

For example, the L'Oreal shareholder does not require a 14% [3] return on book equity of €14.7 billion, but an 8% return on market capitalisation of €45 billion! Similarly, an investor buying Deutsche Telekom bonds with a nominal yield of 9.25% at a price of 131% of the nominal amount does not require a 9.25% return. Instead, he is looking for 6.6%.[4]

The market value of debt can be estimated without too much difficulty. The process is as follows[5]:

Step 1   Identify the annual contract payments.

Step 2   Determine the credit quality of debt. Credit ratings may be estimated from bond rating models that mimic the behaviour of rating agencies (i.e. an implicit rating).

Step 3   Estimate the yield to maturity for which debt would trade, by reference to current market yields with similar *ratings, maturity and coupons.*

Step 4   Calculate the present value of financing payments, discounting each annual promised payment with the estimated yield to maturity: The result should approximate the market value of debt.

Two comments:

1   This process can be readily applied to just single debt instruments and not only to the entire amount of debt.
2   Step 4 calculations can be simplified if contract payments are constant over time, in which case we can use the following formula:

Estimated market value of debt
$$= \text{Annual interest expenses} \times \frac{(1 - 1/(1 + \text{current } YTM)^{\text{maturity of debt}})}{\text{current } YTM}$$

Section 23.3
SOME PRACTICAL APPLICATIONS

When making an investment decision, and even if using the indirect method, it is not particularly difficult to calculate the cost of capital. If the company is publicly listed, the calculation is based on readily available market data. Average prices are often used

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3 *Book rate of return on 2007 equity.*

4 *Discounted rate of return on a borrowing listed at 131%.*

5 *This approach is inadequate if debt has options features like caps, floors, call provisions, convertibility options, and so on. In these cases we should use the option framework in order to value these derivatives (see Garbade, 2002).*

to smooth out any erratic market swings. If the company is not listed, the calculation is based on the cost of capital of companies of comparable size and risk operating in the same sector of activity. If the peer sample has been well chosen, the resulting cost of capital will be the same as that of the unlisted company.

The indirect method is less adapted to valuations, because to determine the value of equity one needs the cost of capital (see Chapter 32), and to calculate the cost of capital one needs the cost of equity! However, there are two ways to solve this dilemma:

* **use the parameters associated with a target capital structure**, while being careful to use the costs of equity and net debt that correspond to the target capital structure, and not the present costs;
* use the direct method. The advantage of this alternative is that one avoids the frequent mistake of using costs of equity and debt that do not correspond to the capital structure in question.

1/ DIVERSIFIED COMPANIES

The overall cost of capital of a diversified company can be calculated similarly to a company with a single business. Conversely, the analyst should be cautious if the divisions do not show the same risk profile. In these cases, each division should be analysed separately according to its cost of capital; the weighted average costs of capital of different divisions would then represent the overall cost of capital for the company. As shown in Chapter 32, diversification does not reduce the cost of capital because it only considers systematic risk. As unsystematic risk can be eliminated by diversification; it does not affect the required rate of return.

2/ MULTINATIONAL COMPANIES

A similar logic applies to companies operating in different countries. A British company investing in Russia, for example, should not use a discount rate based on British data just because its suppliers of funds are British. After all, the project's flows are affected by the Russian systematic risks (inflation, taxation, exchange rates, etc.), rather than the British systematic risk. Therefore, the company should correctly apply a beta reflecting the project's sensitivity to Russian systematic risk.

After the West-based company has invested in Russia, its cost of capital will probably be higher. The difference would be made up of two costs, a lower one for western Europe and a higher one for Russia reflecting the different levels of systemic risk (political and macroeconomic) in the two regions.

This approach avoids the frequent error of discounting flows denominated in one currency using discount rates denominated in another currency.

3/ EMERGING MARKETS

In developing countries, calculating the cost of capital of an investment raises some practical problems. The risk-free rate of local government bonds is often just wishful thinking, since these countries have little solvency. The local risk-free rate and betas of local

peer groups are rarely measured, let alone significant, given the limited size of financial markets in these countries.

We suggest Bancel and Perrotin's (1999) system for calculating the cost of capital in such cases:

	Government bond rate of the euro zone
+	Sovereign spread
+	$\beta_E \times$ European risk premium
=	Cost of capital in an emerging market

The sovereign *spread* represents the difference between bond yields issued on international markets (in euros or dollars) by the country in question vs. those offered by euro- or dollar-zone bonds. This yield represents the political risk in the emerging country. When the developing nation has not made any international issues, it is possible to use a bond issue by another state with the same credit rating as a benchmark.

β_E is the beta coefficient of the sector of activity calculated in developed financial markets. This parameter measures the sensitivity of an industry's flows to the overall economic environment. It is shaped by the sector of activity, not the country.

Obviously, this rate must be applied to flows that have been converted from their local currencies into euros. If the flows are denominated in dollars, then remember to apply a USD rather than a euro benchmark.

For example, it is possible to calculate the cost of capital of a Chilean investment project based on the following assumptions: $\beta_E = 0.82$, r_F in the US = 5%, a Chilean government bond rate of 7.5%, a US risk premium of = 4%:

	5%
+	7.5% − 5%
+	0.82 × 4%
=	10.78% on flows denominated in dollars

If the project's flows are denominated in Chilean pesos, the cost of capital is converted from dollars into pesos as follows:

$$\text{Cost of capital in pesos} = \frac{1 + \text{Cost of capital in US\$}}{\dfrac{1 + \text{Inflation rate in US}}{1 + \text{Inflation rate in Chile}}} - 1$$

4/ COMPANIES WITH NEGATIVE NET FINANCIAL DEBT

For the purposes of this discussion, disregard negative net debt situations that occur when a company has sold a major asset in order to use the proceeds for another investment – such as the buyback of shares, etc. – since such a situation is temporary.

Consider a group that, for structural reasons, has net cash of 2 with no banking or financial debt, and equity of 9.

A*ssume that the shareholders buying these shares understand that they are buying both operating assets with a given risk level and have a cash situation with virtually no risk.* In other words, the risk on the share is lower than the risk on the company given the structurally positive net cash balance.

The cost of capital of this company can be estimated using the indirect method applying a **negative value** for V_D. So, in this example, if the cost of equity is 7% and net cash generates 2% after taxes:

$$k = 7\% \times \frac{9}{9-2} + 2\% \times \frac{-2}{9-2} = 8.4\%$$

To offer the 7% return required by shareholders, the company would have to invest in projects yielding at least 8.4%. The 7% cost of equity is the weighted average of the required 8.4% return on capital employed and the 2% on net cash.

The company's cost of capital is thus 8.4%.

The cost of capital for a company with a structurally positive cash balance does not differ from that of a company with the same capital employed but no cash. The cost of equity changes, but the cost of capital remains the same.

5/ PRIVATE COMPANIES

In order to examine the cost of capital of private or unlisted firms, well-diversified investors make underlying assumptions about the CAPM that are less defensible. The owner of a private firm may be willing (or even have to) invest the bulk of his wealth in the business. In this case, he will be concerned with the total risk for the firm, rather than just the market risk.

With undiversified investors, there are two basic ways to add the discount for *lack of marketability* in the cost of equity of a private firm:

* Add a premium to the cost of equity to reflect the higher risk created by the owner's inability to diversify. In this case, one can use the returns demanded by venture capitalists on their investments in fledgling businesses. The problem with this approach is that it is impossible to know how much of their required rate of return – which can range between 30% and 50% on their portfolios – is for lack of marketability.
* Adjust the beta to reflect total risk rather than market risk. This adjustment is relatively simple, since the R^2 of the regression measures the proportion of risk that is the market risk:

$$\text{Total Beta} = \frac{\text{Total risk}}{\text{Systematic risk}} \times \beta = \frac{1}{R^2} \times \beta$$

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Section 23.4

CAN CORPORATE MANAGERS INFLUENCE THE COST OF CAPITAL?

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Chapters 33 and 34 demonstrate why there is little point in using debt and its tax advantages to lower the cost of capital. While net debt costs less than equity, it tends to increase the risk to shareholders, who retaliate by raising the required rate of return and consequently the cost of equity. Debt works to the advantage of the company, because the interest on the net debt can be deducted from its tax base (which it cannot do for dividends). The opposite tends to apply to investors.

In short, in a perfect world in which investors had diversified portfolios, one man's gain would be another man's loss.

Moreover, if debt really did reduce the cost of capital, one would have to wonder why highly efficient companies, such as L'Oréal, Nestlé, Toyota, Dassault and SAP are not levered, given that they have no reason to fear bankruptcy.
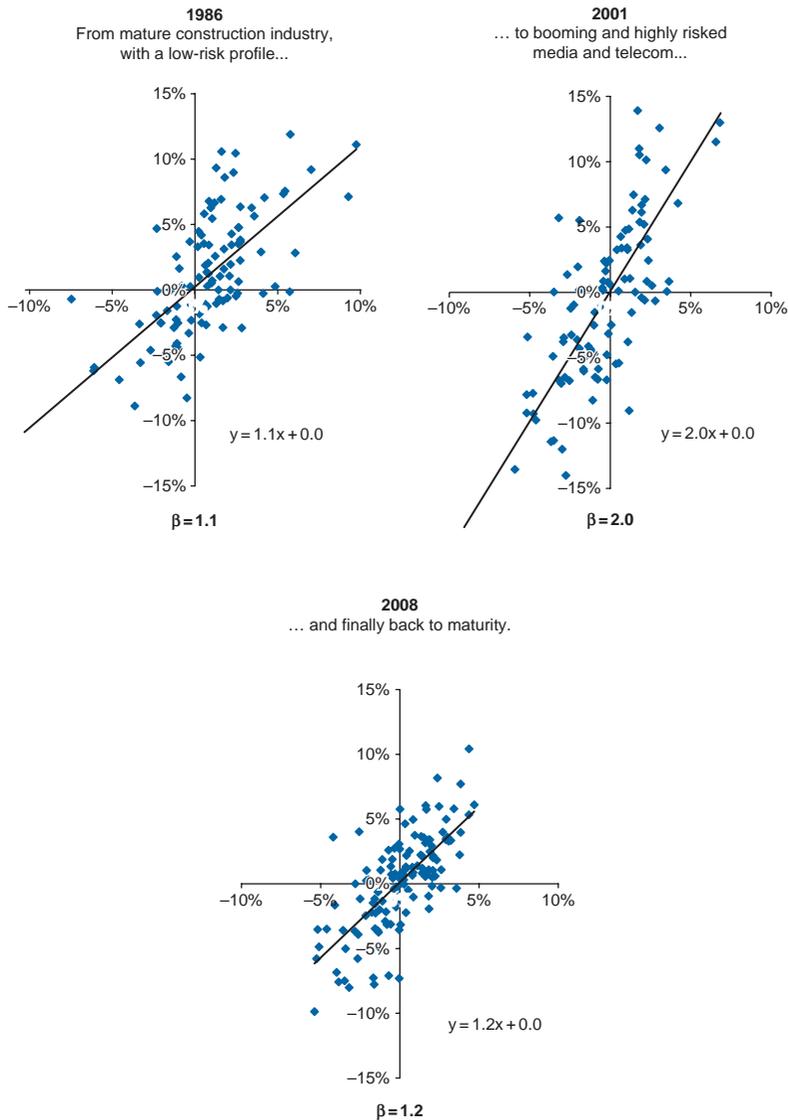
Since the cost of capital depends on the risk to the company, the only way it can be lowered is through risk-reducing measures, such as:

- Lowering the breakeven point by shifting from fixed to variable costs, i.e. subcontracting, outsourcing, etc. Unfortunately, the margins will probably decline accordingly.
- Improving the business's visibility and smoothing its cyclical nature, i.e. winning medium-term supply contracts with important clients. Here too, however, margins may be affected since, in exchange, the clients will demand price concessions.
- Diversifying the business does not help as it does not reduce market risk, but rather specific risk, which is the only one to be remunerated.
- Shifting from a risky activity (e.g. a biotech startup) in a high-risk country like Pakistan to a safer business in a more stable country (cheese production in Switzerland), will no doubt cut the cost of capital, but it will also lower profitability. In addition, it would have no impact on value, since it is simply a lateral move in the market.

Chapter 34 analyses how, under certain conditions, financial engineering can actually lower the cost of capital, but only by narrowing the CEO's margin for manoeuvre. In the real world, there are no free lunches!

> In conclusion, managers have virtually no means of lowering the cost of capital while simultaneously creating value. Their only viable strategy is to improve the return on capital employed by increasing flows and reducing the amount of capital employed.

Similarly, increasing the risk for capital employed increases the cost of capital, but value will not be destroyed if profitability improves at the same time.

BOUYGUES: IMPACT OF BUSINESS PROFILE EVOLUTION ON THE β

1986
From mature construction industry,
with a low-risk profile...

y = 1.1x + 0.0

β = 1.1

2001
... to booming and highly risked
media and telecom...

y = 2.0x + 0.0

β = 2.0

2008
... and finally back to maturity.

y = 1.2x + 0.0

β = 1.2

Source: Datastream, monthly data.

COST OF CAPITAL: A LOOK AT THE EVIDENCE

A study by Gitman and Vanderberg (2000) compares the cost of capital methodologies of major US corporations in 1997 and 1980. The results show that practitioners have substantially changed their practices for computing the cost of capital.

There is robust evidence that the gap between theory and practice is rapidly narrowing. Firms that use the required return from investors as the primary procedure for the cost of equity capital have increased from 35.6% to 70.3%. Conversely, the use of the historical dividend yields has a lower relevance. It is also important to note that 93% of firms estimating required shareholders return (64.9% ÷ 70.3%) use CAPM as the preferred cost of equity capital techniques.

Procedure	1980 (%)	1997 (%)
Historical dividend yield plus estimate of growth	3.40	4.50
Return required by investors	35.60	70.30
APT	NA	0.90
CAPM	NA	64.90
Other	NA	4.50
Current dividend yield plus estimate of growth	26.00	9.00
Dividend yield estimate only	1.70	0.00
Cost of debt plus a risk premium for equity	13.00	17.10
Earnings/price (E/P) ratio	15.80	2.70
Market return adjusted for risk	22.60	14.40
*Totals**	*118.10*	*118.00*

* Response totals greater than 100% because of multiple responses.

These results are consistent with those obtained by Graham and Harvey (2001), shown below. Their survey provides further evidence of the increasing popularity of the CAPM method to calculate the cost of capital:

Cost of equity capital method	Percentage of CFOs who use a given method
CAPM	72
Arithmetic average historical return	48
Multibeta CAPM	33
Dividend discount model (DDM)	15
Investor expectations	13
Regulatory decisions	6

Using a scale with 2% intervals, Gitman and Vanderberg (2000) asked firms to detail their firm's approximate overall cost of capital. The following table compares the results from two different years, 1980 and 1997:

Range of overall cost of capital (%)	October 1980 (%)	April 1997 (%)
Less than 5	1.70	0.00
5–7	0.60	0.90
7–9	3.40	5.50
9–11	10.10	43.60
11–13	20.90	28.20%
13–15	65% 21.50	14.50
15–17	22.60	3.60
17–19	12.30	2.70
19–21	4.00	0.90
21–23	0.60	0.00
23–25	0.60	0.00
Greater than 25	1.70	0.00
Approximate mean	*14.25*	*11.53*

(9–11, 11–13, 13–15 group for April 1997 = 86%)

The most frequent response in 1997 was between 9 and 11%, well below the corresponding response in 1980 (15–17%). The difference between the two values results mainly from the decline in interest rates in the United States. It may also be attributable to a reduction in average risk faced by responding firms.

Finally, it is interesting to examine the frequency of cost of capital revision:

Frequency of revision	1980 (%)	1997 (%)
Annually	21.50	27.12
When environmental conditions change sufficiently to warrant it	50.30	49.20
Quarterly or semiannually	4.00	5.10
Less frequently than annually	13.00	8.50
Each time a major project is evaluated	11.20	10.20
Totals	*100.00*	*100.00*

The answers indicate that the majority of respondents revise their cost of capital when environmental conditions change sufficiently to warrant it. The frequency of revisions of the cost of capital has increased over time, and is recently done on a yearly basis.

A final study by Bruner et al. (1998) yielded results that are also consistent with previous ones. Here are the main results of their findings:

1   There are different alternatives in the risk-free rates choice. An almost equal percentage of analysts use 10 and 30 year Treasuries, while a lower percentage uses 3-month T-bills.
2   The majority of corporations use published sources for the beta estimation while around 30% of respondents estimate it themselves.
3   Around 40% of firms use a fixed rate of 5–6% for the market risk premium, while a lower percentage (around 10%) uses a value between 4–4.5%. Around 50% of financial advisers who were interviewed claim to use a much higher rate of between 7–7.5%.

SUMMARY

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The cost of capital or the weighted average cost of capital (WACC) is a fundamental concept in corporate finance. It is relied on for making investment decisions and for the valuation of businesses.

The cost of capital is not just the risk of capital employed. It exists before the capital structure is even fully assembled or finalised. In fact, creditors and shareholders will determine the rate of return they require on debt and equity on the basis of the capital structure and of the risk of capital employed.

Only for calculation purposes is the cost of capital often calculated as the weighted average cost of equity and debt.

The cost of capital can be calculated either:

- using a direct method on the basis of the β of the capital employed; or

- using an indirect method where it is equal to the weighted average of the values of the cost of equity and the cost of net debt; or

- by observing the value of capital employed, when this figure is available.

For a diversified company, there are as many costs of capital as there are sectors in which it operates. Similarly, every country or economic area has its own specific cost of capital, which is dependent upon the political landscape and macroeconomic risks.

For emerging countries, the methodology must be adapted to factor in both the lack of certain data (risk-free interest rate) and international parameters (the industry's β).

A company's negative net debt structure brings down the cost of its equity, but has no impact on the cost of capital, even if the company has no cash.

1/When is the cost of capital equal to the cost of equity? Can the cost of capital be equal to the cost of debt?

2/Why does the cost of capital constitute a direct link between return on capital expenditure and the returns required by capital investors?

3/Why is the cost of capital not an accounting concept?

4/What is the cost of capital equal to?

5/Is the cost of equity equal to the return on the shares?

6/What is the cost of reserves equal to? And the cost of depreciation?

7/How many costs of capital are there in a company that has diversified into different (business) sectors but not geographic areas? What about if it has done so within each of the company's divisions?

8/Can a company that invests in projects on which the returns are lower than its cost of capital continue to obtain resources through cash flow? Through debt? Through capital increases?

9/A listed company launches a takeover bid on another company at a price that is far too high. According to the cost of capital theory, what should the sanction be?

EXERCISES

1/ What is the cost of equity of a company whose shares are trading at 30.2 and which pays a dividend of 5 over 5 years and 6 after 5 years?

2/ What is the cost of debt for a company whose debt at 11% has a nominal value of 1000, is trading at 1037.9, and has a life of 5 years (redemption at maturity)?

3/ Use the answers to questions 1 and 2 and calculate the cost of capital of this company. The company has issued 1000 shares.

4/ Calculate the cost of capital of a company for which the key figures are as follows:

	Equity	Debt
Book value	10,000	1000
Value	12,000	1000
Perpetual remuneration	1800	100

5/ What is the net present value of the following perpetual investment before and after tax?

Cost: 100
Cash flow before tax: 26

Tax rate: 50%

Capital structure:

	Percentage (%)	Cost before tax (%)	Cost after tax (%)
Equity	60	24	24
Debt	40	16	8

Cyclone case study

The Cyclone group operates in three sectors: the sale of commercial shipping equipment, shipping of goods by sea between mainland France and Réunion (the group owns two container ships), and a small shipyard which oversees the careenage of most of the boats in Réunion.

The three divisions are listed on the *Second Marché* or on the *Marché Libre* of the Euronext Paris stock exchange.

	Equipment sales division	Maritime shipping division	Shipyard
Market capitalisation	2 160	18,520	632
Shareholders' equity	1 580	10,512	824
Net debt (estimated value)	812	−12	−1356
Sales	22,210	23,724	701
EBIT	405	1625	82
Net income	226	1057	−24
β_E observed	0.8	0.5	1.2
β_D estimated	0.1	0	0.3
Tax rate	35%	35%	35%

(a) What is your view of the financial health of this group (very simple financial analysis)?

(b) The required return for a risk-free investment is around 6.5% (before tax) and the average required return for the market portfolio is 11% (before tax). Calculate the overall cost of capital for this group.

Questions

1/ *When debt is zero. Yes, but only if the company is carrying very heavy debts.*
2/ *By definition.*
3/ *Because it is the cost at which the company could reconstitute its liabilities today.*
4/ *To the required return on the capital employed.*
5/ *No, it is generally much higher.*
6/ *Cost of reserves: cost of capital increase, cost of depreciation: company's cost of capital.*
7/ *As many as there are divisions. Only one.*
8/ *Yes, unfortunately using cash flow. Yes, using debt if its debts are still low. With difficulty through a capital increase.*
9/ *Its value drops.*

Exercises

1/ *18.00%.*
2/ *10.00%.*
3/ *17.74%.*
4/ *14.62%.*
5/ *Before tax: $k = 20.8\%$; $NPV = 25$ – After tax: $k = 17.6\%$; $NPV = -26$*

Cyclone case study

(a) *The group is economically cohesive (it is not a conglomerate). The shipping and equipment sales divisions are profitable, although the shipyard is not; however, it is a small division compared with the others. Overall, the group is profitable and carries very little debt. There is the possibility that the current capital allocation may not be optimal, given the co-existence of profitable divisions and a nonprofitable division.*

(b)

	Equipment sales division (%)	Maritime shipping division (%)	Shipyard (%)	Group (%)
k_E	10.10	8.75	11.90	8.98
k_D after tax	4.52	4.23	5.10	4.89
K	8.57	8.75	7.26	8.60

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