**Evaluate the methods by which a firm may attempt to choose its optimal capital structure.**

The issue of an optimal capital structure has been a largely debated one over the past number of years, with many methods being put forward by many different authors. The question many of these authors attempt to answer is whether or not capital structure matters? Capital structure is the way a firm finances its investments, whether it uses equity, debt or a mixture of both. If capital structure can affect firm value then is there a "golden rule" to obtain an optimal capital structure to maximise firm value?

Fairchild (2003) looked at the determinants of BT's debt levels from 1998-2002 and what it showed us about optimal capital structure. BT is an extremely useful case as over the period 1998-2001 they dramatically increased their debt to finance its bidding for 3G mobile licences, during which time their firm value first rose and then fell off. Using certain capital structure methods they then reduced their debt in 2002 in an attempt to stop firm value decreasing. We will use this case study throughout to help us discover if this capital structure "golden rule" exists.

The major breakthrough in capital structuring theory came with Modigliani and Miller's propositions in 1958. When they first looked at whether or not there was an optimal capital structure they based their conclusions on a number of strong implicit and explicit assumptions: symmetric information exists between investors and managers; managers are unselfish; debt is risk free; corporate taxes do not exist. Based on these assumptions, they concluded that firm value was unaffected by its leverage and that investment and financing decisions could be separated.

Modigliani and Miller first looked at the effects of differing levels of debt on the cost of capital. As MM assumed that debt was risk free this meant the cost of debt was the same as the risk free rate of the market. If debt is risk free, then MM implied that the equity holders were the only risk takers because debt holders are always paid first.
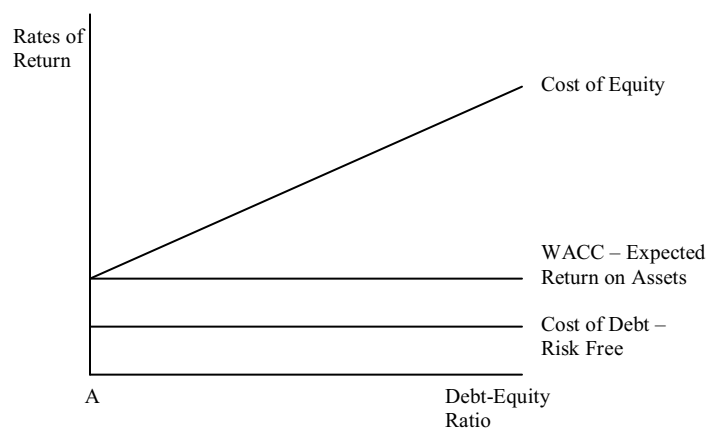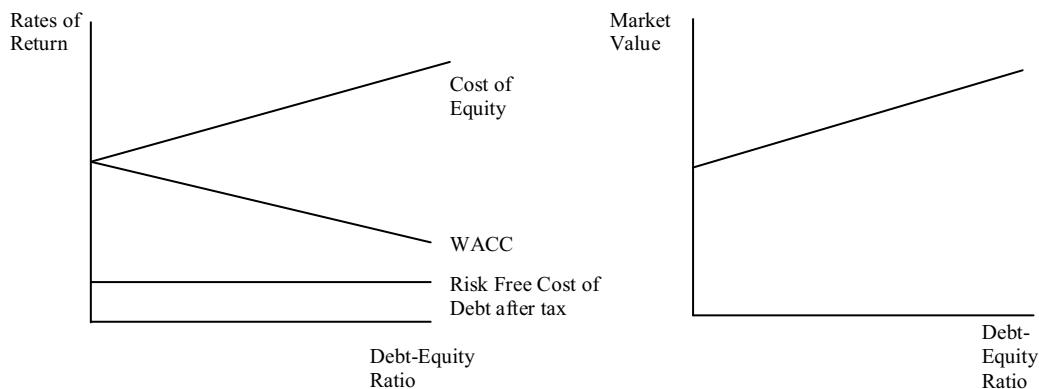

At point A, there is no debt and hence equity holders only face the business risk of the firm. As the firm becomes more leveraged, equity holders face more and more financial risk as cashflows to equity holders become more volatile and therefore cost of equity rises in order to compensate the equity investors for taking on this higher risk. MM point out that

considering cost of debt or equity on their own, however, is worthless and the overall cost of capital (measured by the weighted average cost of capital – WACC) is the only measure worth considering, and it is this measure that should be used as the discount rate in valuing the firm. As shown by the graph above, MM showed that despite differing cost of debt and cost of equity, the WACC is unaffected by the debt-equity ratio. As V=NCF/WACC, assuming perpetuities, then we can see the value of the firm is also unaffected. In such an environment absent of taxes therefore, MM showed that the capital structure decision becomes irrelevant.

Market Value | Debt-Equity Ratio
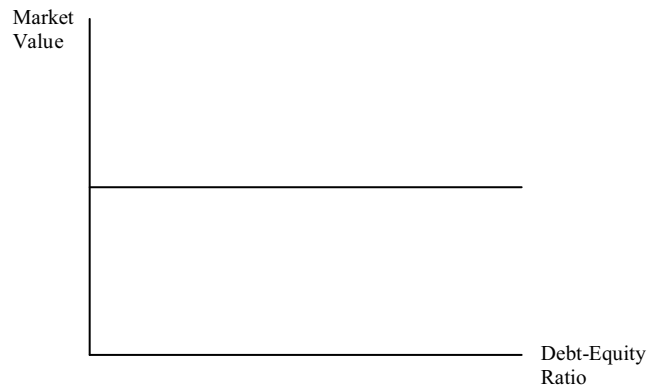
These findings, however, were not very useful for financial managers as they could not put them into practice in the real world. In a later paper, MM preserved the environment they introduced but allowed for corporate taxes. Their findings on this occasion were that in the presence of taxes, such benefits, by way of interest tax shield, do accrue when leverage is increased. This outcome, whose proof can be found in almost any academic finance text (see, for instance, chapter 16 of Ross *et al* (1998) or chapter 18 of Brealey and Myers (1996)), is that the value added to a firm by taking on debt is:

$$\Delta V = DT$$

Rates of Return — Cost of Equity — WACC — Risk Free Cost of Debt after tax — Debt-Equity Ratio

Market Value — Debt-Equity Ratio

As shown by the graphs above this simply suggested that a firm should take on as much debt as possible to take advantage of the tax benefits it yields. Again this theory proved unsatisfactory for managers.

Modigliani and Miller showed that capital structure decisions do not affect firm value when markets are perfect, taxes do not exist and the firm's investment and financing decisions could be separated. However, when one or more of the MM assumptions are relaxed, many authors demonstrate that changes in the debt-equity mix can affect firm value.

MM had assumed risk free debt, but risk free debt along with no taxes was a heavily unrealistic point of view and a more traditional view evolved, in that a firm should combine tax relief with debt capacity when trying to find their optimal capital structure.
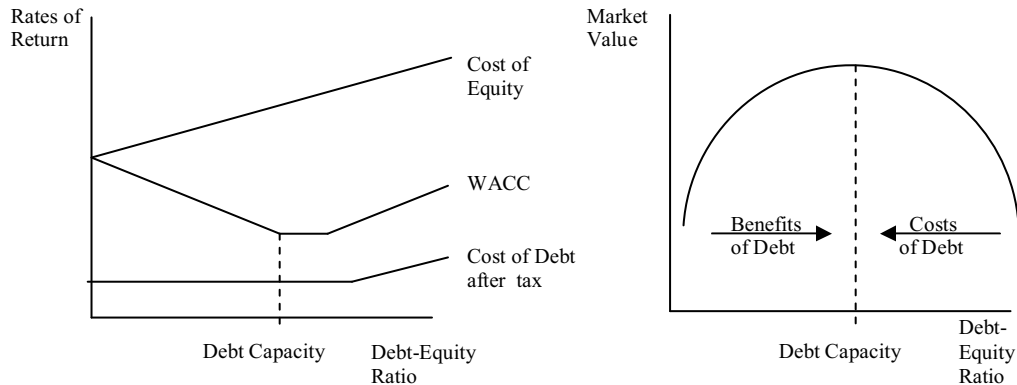
Debt capacity is the point beyond which the firm has so much debt that even the debt holders are not certain that they will get the fixed return on their supposed risk free asset. Debt therefore becomes risky beyond the debt capacity, and the cost of debt rises. This more traditional view believes the best approach to finding the optimal capital structure is, as shown by the above graph, to trade off the tax benefits of debt and the costs of risky debt to maximize firm value. As Fairchild states, when BT won the 3G mobile contract, "they may have believed that the increased prospects for the Group had increased their debt capacity". As a result they wanted to take advantage of the supposed extra tax benefits of debt available and justified increasing debt. BT, however, possibly overestimated the prospects of 3G and increasing debt led to a drop in overall firm value. This suggests BT went beyond their debt capacity, but also suggests that this traditional view of a tradeoff between costs and benefits of debt could work if applied properly.

Damadoran (2001) discusses the debt tradeoff in greater depth and argues that firms should determine optimal capital structure by trading off the costs and benefits of debt. He summarises it by saying that debt provides two significant advantages and that these advantages should be weighed up against three significant costs. The rule he argues firms should therefore use to choose its capital structure is that "if the marginal benefits of borrowing exceed the marginal costs, the firm should borrow money. Otherwise it should use equity."

We have already discussed one of his advantages in that using debt yields a tax advantage. But he also states using debt could make managers more disciplined in their actions. Jensen (1986, page 323) defines the free cashflow as the "cashflow in excess of that required to fund all projects that have a positive net present value when discounted at the relevant cost of capital." The dispersion of this free cashflow could happen because managers may start using the free cashflow to invest in negative net present value projects simply because they derive personal utility from working with the money rather than from paying it to the shareholders. For Jensen, debt is beneficial by binding the firm to interest payments, thus reducing free cashflow. Jensen uses evidence from the oil industry to back up his arguments as in 1973 the oil industry generated large cashflows and the management of these oil firms wasted money on unnecessary R&D – investors recognised this as a bad investment

and firm value fell. Too much debt, however, and the borrowing risk may be so great that managers become reluctant even to take on the positive NPV projects – another tradeoff.

Damadoran argues that these two main benefits of debt should be traded off against three main costs of borrowing. The first one is self explanatory in that debt increases the expected cost of bankruptcy – the more debt a firm possesses the more investors expect the firm to go bankrupt. Along with the direct cost incurred in terms of cash outflows at time of bankruptcy, the firm also incurs several indirect bankruptcy costs such as the loss in revenue that may occur due to customers perceiving the firm is in trouble. Firms that use debt instead of equity also reduce the flexibility to raise additional financing later because of the covenants that bondholders use to protect against shareholder actions and can increase the conflict between stockholders and lenders (agency costs).
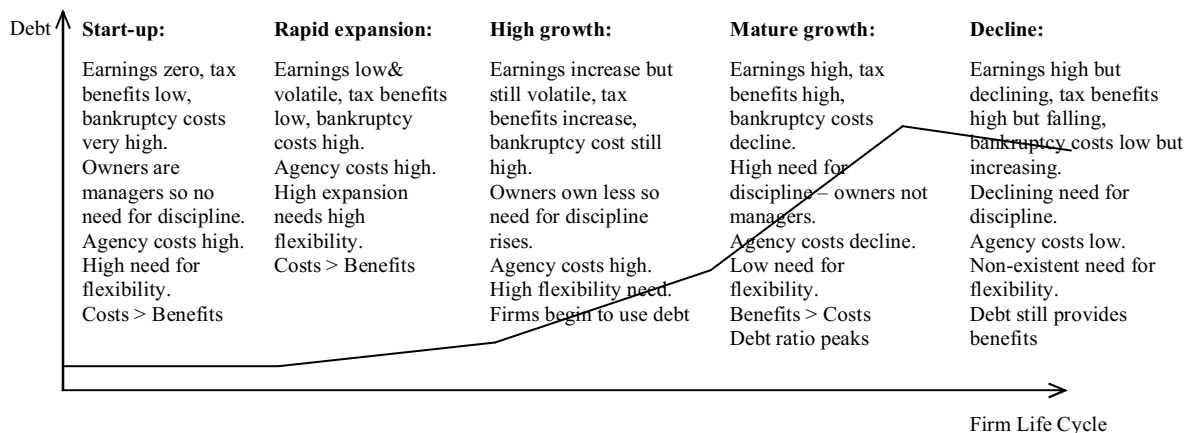
Jensen and Meckling (1976) were the first to look at the problem of agency costs in relation to capital structure. Removing the MM assumptions, managers now have incentives to act for themselves and may possess more information about the firm than the market. JM looked at a firm run by a single manager, who owns shares in the firm, deciding whether to issue debt or equity. If the firm issues equity, the manager's stake in the firm is diluted, reducing his concern with the value of the firm and as a result leading him to trade off firm value for his own private benefits. Therefore, the more debt issued, the greater the manager's stake in the firm and the less likely he his to take private benefits. In the case of BT, increasing managerial effort incentives may have been the motive for issuing more debt. Like most other capital structure authors, however, JM argue both for and against debt. They counter the benefit discussed by saying issuing too much debt will give the manager such a large ownership that he will want to take even the risky projects on (risk shifting). This is simply because he will stand to gain massively on the upside of the project and lose nothing on the downside since equity holders are only paid from what's left after paying the debt holders. By trading off these benefits and costs of debt, JM obtain an optimal capital structure.

The debt tradeoff theories proposed by Damadoran amongst others are excellent on paper. They are, however, all qualitative models. There is nothing to say where the optimum point lies on the firm value curves – all it shows is that a trade off exists.
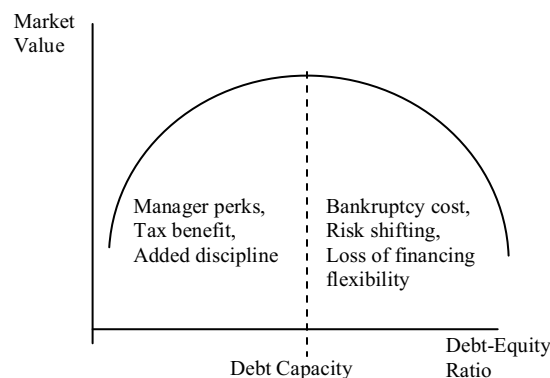
Not only do firms not know where the debt capacity lies but there are other capital structure factors which affect a firm's value that we haven't discussed yet.

So far we have looked at the rule that firms should choose the mix of debt and equity by trading the benefit of borrowing against the costs. However, in reality, firms may use three alternative methods that have been put forward. We have already looked at Jensen's free cashflow argument but he also uses it to relate the level of debt to the life cycle of the firm. A capital structuring method firms may choose to adapt is to tradeoff debt and equity by where the firm is in the growth life cycle.

Debt

Start-up:	Rapid expansion:	High growth:	Mature growth:	Decline:
Earnings zero, tax benefits low, bankruptcy costs very high. Owners are managers so no need for discipline. Agency costs high. High need for flexibility. Costs > Benefits	Earnings low& volatile, tax benefits low, bankruptcy costs high. Agency costs high. High expansion needs high flexibility. Costs > Benefits	Earnings increase but still volatile, tax benefits increase, bankruptcy cost still high. Owners own less so need for discipline rises. Agency costs high. High flexibility need. Firms begin to use debt	Earnings high, tax benefits high, bankruptcy costs decline. High need for discipline – owners not managers. Agency costs decline. Low need for flexibility. Benefits > Costs Debt ratio peaks	Earnings high but declining, tax benefits high but falling, bankruptcy costs low but increasing. Declining need for discipline. Agency costs low. Non-existent need for flexibility. Debt still provides benefits

Firm Life Cycle

Jensen argues this is a good predictor and method of determining firm's debt-equity ratios but as with other methods, there will be variations between firms in different businesses at each stage in the life cycle and a "golden rule" therefore cannot be taken from one industry to another.

Firms may also benchmark against other firms in their industry. This is a simple technique whereby firms will look at what successful, similar companies in their industry are doing and then copy their capital structure. Empirical evidence suggests firm don't stray too far from their sector averages. In Bill Robinsons article "the rise and rise of bond finance" he looks at this idea in greater depth and concludes "it is a good starting point". But this method can be dangerous – who's to say that other firms in the sector know what they're doing? According to Damadoran it can also be dangerous under two other scenarios – when there are wide variations in growth potential across companies within a sector and when firms have too much/little debt. For example, if an entire sector changes and new competition breaks down monopoly power then stable earnings can turn into volatile earnings and companies will be carrying too much debt.

Signalling Theory (Myers and Majluf 1984, Ross 1977, and Leland and Pyle 1977) is based upon the assumption of superior knowledge possessed by managers as insiders as opposed to outside investors who know much less about the economic health of a firm. For this reason investors may make certain assumptions about the firm that may or may not be correct. Ross (1977) looks at the markets perceptions of a manager's ability. As debt carries a bankruptcy threat, high ability managers are thought to be able to separate themselves from low ability managers by issuing more debt to signal how good and confident he is that the

firm will repay a high level of debt. The market, in theory, reacts to this signal and firm value rises. For example, BT may have issued debt to signal their confidence in the future but, as explained they went well past their optimal debt-equity mix. Leland and Pyle (1977) develop a simple model of capital structure in which managers seek financing for projects whose true values are only known to them. If they issue a small amount of equity, their stake in the firm remains high and this can signal that the value of the project is also high. They therefore suggest firms avoid issuing large amounts of equity.

Myers and Majluf adapt this problem to the situation where a firm must issue stock to raise cash in order to undertake a valuable project where managers know more about the project value than investors. This situation can lead to "lemons" problem – if the manager knows the project has a positive NPV, then the equity is currently undervalued and he will want to issue debt and vice versa if the project has a negative NPV and investors overvalue the firm. Recognising this policy of managers, investors will perceive an equity issue as bad news, making the cost of issuing equity higher. This problem led Myers and Majluf to recommend a pecking order for firms' capital structure decisions. This suggested, before any other fund raising method, if the firm can use internal financing sources or issue low-risk debt they should do so, as the cost of asymmetric information can then be minimised. This theory was supported by a study by Donaldson (1961) who found that "management strongly favoured internal generation as a source of new funds even to the exclusion of external funds" (cited by Cai et al, 2003). Overall, Pecking-Order theory suggests firms issue debt first, then possibly hybrid securities such as convertible bonds, then equity as a last resort. Byoun and Rhim (2003) found the pecking order "to be much more binding force for small firms and non-dividend paying firms, supporting the hypothesis that small firms are more likely to follow the pecking order because of the difficulty in accessing external financing sources." The pecking order has also received strong empirical support. Baskin (1989) and Toy (1974) find debt ratios to be positively related to the need for funds and negatively related to the availability of internally generated funds.

Damadoran argues that in all three of these alternative methods, firms still implicitly make the trade-off between costs and benefits of debt but even so each method shows that although they trade off costs and benefits of debt, each firm will have different debt ratios depending on the industry, growth of the firm and size of the firm. Further disproving a "golden rule" exists and emphasising how dynamic and individual a process capital structuring is.

All the capital structuring methods discussed so far have been qualitative and have provided firms with guidelines as opposed to a formula. Levy (1998) and Opler et al (1997) have tried to develop a formula. Both methods form a sensitivity analysis. Opler et al's formula included the tax shield, bankruptcy costs and business risk. Opler et al failed to include agency costs so Levy added them in his formula a year later. This formula, however is still very hard to calculate in the real world, as Bill Robinson states, "the benefits of debt which show up in the cashflows are relatively easy to quantify but the costs are both uncertain and difficult to measures. Added to these calculation problems, they still fail to recognise signalling along with a whole host of other factors.

We have discussed in depth the main broad factors that effect capital structure and that Levy included in his formula, but there are many other factors which structuring methods have failed to take in account. This just further emphasises how hard determining a firm's

optimal capital structure is. For example, we haven't even taken into account behavioural finance factors. Heaton (2002) talks about managers overestimating good state probability. He believes managers may take an optimistic view and believe the market undervalues equity of the firm and that projects have a higher NPV than they actually do. He may think he has the ability to turn a negative NPV project into a positive NPV project when he doesn't have this ability. To counter this overinvestment issue, Heaton argues that behavioural factors can lead to a firm not taking positive NPV projects too. He therefore concludes that an underinvestment-overinvestment trade-off exists. We have also failed to look at the possibility that firms, like BT, may just fall into the trap of viewing debt as cheaper than equity – a view Bill Robinson agrees with.

While optimal capital structure is theoretically well defined, measuring the economic value of its various components and identifying it in practice are an art. The theoretical considerations developed and discussed can serve as a qualitative guide in seeking the optimal capital structure but they do not constitute a "golden rule" for finding it. What has been learnt from this discussion is that optimal capital structures vary from industry to industry or from firm to firm, and that several trade-offs have to be taken into account. As proved by the case of BT, above all other factors, capital structuring is a dynamic process that needs to be revisited from time to time and should always be considered on a case by case basis.

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