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CAPITAL STRUCTURE DECISIONS OF A PUBLIC COMPANY

by Oliver Hart (*)

Abstract

This paper develops a theory of the capital structure decisions of a large public company with dispersed shareholders. The management team of such a company has a fairly free hand to pursue its own goals, possibly at the expense of those of shareholders. We argue that placing debt in the company's capital structure is one way for investors to constrain management. We develop three models to analyze this. In each model there is a conflict of interest over the size of the firm; management wants a bigger "empire" than do investors. After we have developed the models, we discuss whether they are capable of explaining the stylized facts about capital structure. We conclude by comparing the agency approach developed in the paper with other theories in the literature.

Contents

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1. Introduction[1]

The purpose of this paper is to develop a theory of the capital structure decisions of a large public UK - or US - style company; that is, a company with dispersed ownership. Such a company is subject to at least two problems of corporate governance that are not relevant in the case of a closely held company. First, those who own the company, the shareholders, even though they typically have ultimate (residual) control rights in the form of votes, are too small and numerous to exercise this control on a day-to-day basis. Given this, they delegate day-to-day control to a board of directors (who in turn delegate it to management). In other words, to use the phrase made famous by Berle and Means (1933), there is a separation of ownership and control.[2]

The second, related issue is that dispersed shareholders have little or no incentive to monitor management. The reason is that monitoring is a public good: if one shareholder's monitoring leads to improved company performance, all shareholders benefit. Given that monitoring is costly, each shareholder will free ride in the hope that other shareholders will do the monitoring. Unfortunately, all shareholders think the same way and the net result is that no - or almost no - monitoring will take place.

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1. An early version of this paper was the foundation for the Woodward Lecture presented at the University of British Columbia in November 1991. The paper is a self-contained version of Chapter 6 of the forthcoming book, Firms, Contracts and Financial Structure, to be published by Oxford University Press. The author would like to thank Steve Tadelis for helpful comments.

2. A more accurate description might be that there is a separation of ownership and effective control or management. The point is that the shareholders do retain ultimate control in the form of votes.

Sometimes this free-rider problem can be overcome by someone who acquires a large stake in the company and takes it over (a "raider"). However, the takeover mechanism does not always work well.[3] The conclusion is that in many cases the managers or board of directors of a public company can pursue their own goals, possibly at the expense of those of shareholders, with little or no outside interference.

Our purpose in this paper is to study the capital structure decisions of a public company in light of the separation between ownership and control.[4] As we have noted above, the management team of such a company has a fairly free

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3. One reason is that a raider may have to share a large fraction of the takeover gains with shareholders of the target company, because (i) minority shareholders can free-ride on the raider's offer (see Grossman and Hart, 1980); or (ii) rival bidders can free-ride on the information embodied in an initial offer, and make a counteroffer. Hence, a raider may fail to cover the ex ante costs of making a bid. Further factors deterring a raider are management's ability to engage in various defensive measures (lawsuits, poison pills, Employee Stock Ownership Plans), or, at the last moment, to carry out the actions the raider was planning to undertake. The evidence does indeed show that most of the gains from a successful takeover accrue to shareholders of the target firm rather than to the acquiring firm; see Jensen and Ruback (1983).

4. The analysis presented here is based closely on Hart (1993) and Hart and Moore (1994). The analysis applies with most force to a company, all of whose shareholders are small. This is a polar case which turns out to be less common than was once thought, even in the US or the UK (see, e.g., Shleifer and Vishny, 1986a). The theory applies also, however, to the more common case of a company with a few significant, but noncontrolling, shareholders (these might include members of the management team) and many small ones. The theory is <u>less</u> relevant for a company with a few large shareholders (possibly representing a family) with effective voting control. In this last case - common in Germany, Japan and Italy, among other countries - there is little separation between ownership and control, the incentive to monitor is considerable and the model of a closely held company is probably therefore more appropriate.

hand to pursue its own goals, possibly at the expense of those of shareholders; we suppose the latter are interested only in profit or net market value.

For example, as stressed by Marris (1964) and Jensen (1986), managers may be empire-builders: they may wish to carry out projects that are unprofitable, but that increase their power and sense of importance (see also Baumol, 1959). Or, as stressed by Williamson (1964), managers may wish to maximize the various monetary and nonmonetary perquisites they obtain from their company, rather than profit. Managers may also have goals that are more benign and less self-serving than the above, but that are still inconsistent with value maximization. For example, they may be reluctant to lay off - or cut the wages of - workers who are no longer productive, possibly through no fault of their own. They may feel similarly unhappy about terminating independent contractors with whom they have long-standing relationships. Finally, managers may wish to entrench themselves in order to enjoy the power and perquisites their position brings, even when there are others who could run the company better.

What can shareholders do to align management's objectives with their own? One possibility is to put managers on an incentive scheme. However, while an incentive scheme may work well in motivating managers to work hard, it is likely to be less effective in getting managers to relinquish their control benefits. The reason is that, if managers are sufficiently interested in power, empires and perks, a very large bribe may be required to <u>persuade</u> managers to give up these things. It may be cheaper for investors to <u>force</u> managers to curb their empire-building tendencies. Placing debt in the capital structure is one way to do this.

2. The role of debt in a public company

In what follows, we illustrate the constraining role of debt using three simple models. In all three the issue is how many assets should be under management control. In the first model, the focus is on whether management should shrink its empire over time. In the second and third models, we consider a closely related question of how much management should expand its empire. The reason for considering three models is that each has a somewhat different character. After we have described the models we will discuss whether they are capable of explaining the stylized facts on capital structure.

Before proceeding, we should note that traditional corporate finance has, by and large, not adopted the agency approach described here.[5] The literature has either ignored agency problems altogether, or has focussed on the conflict of interest between shareholders and creditors, rather than on that between security-holders and management (on the conflict between shareholders and creditors, see Jensen and Meckling, 1976).[6] Later on we shall discuss why we feel the agency approach is important. Among other things, we shall argue that only an agency approach can explain why a failure to pay debts leads to a penalty in the form of bankruptcy, i.e., why debt is associated with a "hard" budget constraint.

2.1 Model 1 (to liquidate or not to liquidate)

The model, like the other ones used in this paper, is based on one first laid out by Myers (1977).

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5. Exceptions are Grossman and Hart (1982), Jensen (1986) and Stulz (1990).

6. For a survey of the literature, see Harris and Raviv (1991).

Consider a firm consisting of assets in place, and suppose that it exists at three given dates (see Fig. 1).

Fig. 1

t = 0	t = 1	t = 2
Old assets in place	Old assets yield return y_1 Decision whether to liquidate and realize L	Old assets yield return y_2 (if liquidation did not occur at date 1)

At date 0 the firm's financial structure is chosen. At date 1 the assets in place yield a return of y_1. At this time the firm can be liquidated, yielding L (in addition to the y_1 already realized). L stands for the value of the firm's assets in some alternative use. Note that we allow for the possibility that, in some cases, the firm's assets may be more valuable elsewhere.

If the firm is not liquidated, at date 2 the assets in place yield a further return y_2. At this date the firm is wound up, and receipts are allocated to the security-holders. (We suppose that the manager cannot abscond with the funds.)

Note that we take liquidation to be a zero-one decision. A more general treatment would allow for continuous asset sales.

We suppose that the firm is run by a single manager. As emphasized above, we are concerned with a situation where the manager is interested in power, empires, and perquisites as well as profit. To simplify matters, throughout the paper we consider the (admittedly) extreme case where the manager's utility function is strictly increasing in the assets under his control and <u>is completely independent of his monetary wealth</u>. At the same time, in Model 1 we assume that there are no possibilities for the manager to expand his (or her) enterprise, and hence the manager's only goal is to avoid liquidation; moreover, once he has achieved this goal, he has no further use for company funds.[7]

The assumption that the manager's utility is independent of his wealth simplifies the analysis greatly, but we believe that the main insights of our analysis would hold true more generally. An implication of the assumption is that incentive schemes have (essentially) no role to play in motivating management.

Assume that all uncertainty about y_1, y_2 and L is resolved at date 1 and there is symmetric information throughout. Assume also a zero interest rate and that investors are risk neutral.

In a first-best world where contracting is costless, the shareholders would write the following contract with the manager:

(1) Liquidate if and only if $y_2 < L$.

In other words, liquidate if and only if the firm is more valuable liquidated than as a going concern. Such a

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7. This distinguishes Model 1 from a "pure free cash flow model" of the Jensen (1986) variety (a Jensen-type analysis is provided in Model 3). In a pure free cash flow model, the manager always has further uses of company funds and so will squander each dollar of investor returns that is not mortgaged to creditors. Thus in a free cash flow model the value of equity is zero. In contrast, in Model 1, as the reader will shortly see, the value of equity can be positive.

Note that this is not a critical difference between the two analyses since our main results would still hold under the more extreme Jensen assumptions.

contract yields the first-best date 0 present value of the firm,

(2) $V = E[y_1 + \text{Max}(y_2, L)]$.

Note that we do not subtract off from V any wages paid to the manager. In what follows we will make the simplifying (albeit unrealistic) assumption that the manager receives a sufficiently large nonpecuniary utility from working in the firm that he does not require any explicit monetary compensation.[8]

We shall be interested in a second-best situation where y_1, y_2, L, although observable, are not verifiable and hence cannot be made part of an enforceable contract. In particular, the contract (1) cannot be enforced since the courts do not know whether or not $y_2 < L$.

We shall investigate the role of financial structure in substituting for an enforceable contract. We shall suppose that, although y_1, y_2, L are not verifiable, the amount paid out to security-holders is verifiable. Thus securities can be issued at date 0 with claims conditional on the amount that is paid out. For the time being we shall confine attention to the case where the firm issues short-term debt due at date 1, long-term debt due at date 2, and equity; and we shall also suppose that both kinds of debt are senior, in the sense that any new claims issued by the firm at date 1 are entitled to payment only if date 0 debt-holders have been fully paid off. Below we consider the role of more sophisticated securities.

We also assume that any debt the firm issues is dispersed among a large number of small creditors, thus making

8. We suppose, however, that the manager has no (or little) initial wealth and so cannot be charged up front for nonpecuniary benefits.

renegotiation very (prohibitively) difficult because of free-rider and hold-out problems.[9] Thus, if the firm defaults on its short-term debt at date 1, then this triggers bankruptcy which we suppose, in turn, leads to liquidation, i.e., L is realized.[10]

Consider the situation faced by the manager at date 1 once the uncertainty about y_1, y_2 and L is resolved. Define P_1 to be the amount owed at date 1 and P_2 to be the amount owed at date 2 - i.e., P_1 and P_2 are the face values of short-term and long-term debt respectively. (Of course, at date 0 these debt claims will typically trade for less than their face value because of the risk of default.) Given that default leads to bankruptcy and to the loss of control benefits, the manager never defaults voluntarily. If $y_1 \geq P_1$, the manager will pay P_1 to creditors at date 1 and hold $y_1 - P_1$ inside the firm for distribution at date 2. Thus the total return to initial shareholders and creditors will be $y_1 + y_2$ with creditors receiving $P_1 + \text{Min}\ (P_2, y_2)$ and shareholders the rest.

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9. The problem is that renegotiation in the form of debt-forgiveness (or debt-postponement) is a public good: if one creditor forgives her debt, then other creditors benefit. In the limit when there is a continuum of investors, no individual creditor will be prepared to forgive her debt, since she will take the point of view that her decision will have a negligible effect on the outcome and so she would prefer the burden of debt renegotiation to be borne by others. See, e.g., Aggarwal (1994).

10. We ignore more sophisticated bankruptcy systems that try to preserve the firm's going-concern value; examples are US Chapter 11 or the procedure discussed in Aghion, Hart and Moore (1992, 1994). Our results are likely to apply also when more sophisticated bankruptcy systems are in use as long as top managers face a significant risk of losing their jobs. Aghion, Hart and Moore (1992, 1994) argue that this is a desirable property of any bankruptcy mechanism.

Suppose next that $y_1 < P_1$. If $y_1 + y_2 \geq P_1 + P_2$, the managers can still avoid default at date 1 by issuing an amount $(P_1 - y_1)$ of junior debt due at date 2 and repaying this together with the senior debt P_2 out of date 2 income y_2. Thus the total return to shareholders and creditors is again $y_1 + y_2$, of which creditors receive $P_1 + P_2$ and shareholders the rest. However, if $y_1 < P_1$ and $y_1 + y_2 < P_1 + P_2$, then the manager cannot avoid default, and liquidation will occur. In this case, the return to creditors is Min $(P_1 + P_2, y_1 + L)$ and shareholders receive the rest.

Denoting the total return to initial shareholders and creditors by R, we can summarize the above discussion as follows:

$$(3) \qquad R = \begin{cases} y_1 + y_2 & \text{if } y_1 \geq P_1, \\ & \text{or } y_1 < P_1 \text{ and } y_1 + y_2 \geq P_1 + P_2 \\ y_1 + L & \text{otherwise} \end{cases}$$

Notice for future reference the two sources of inefficiency here. Sometimes the manager will liquidate even though $y_2 > L$, because P_1 and P_2 are large relative to y_1 and y_2. Other times he will maintain the firm as a going concern even though $y_2 < L$, because P_1 and P_2 are small relative to y_1 and y_2.

We are now in a position to discuss optimal capital structure. We shall suppose that the firm's capital structure - that is, P_1 and P_2 - is chosen at date 0 to maximize the firm's date 0 market value; that is, the aggregate expected return to all initial security holders: E(R). This may seem an odd assumption given that capital structure decisions are typically made by management (or the board of directors), and we have supposed management to be interested in preserving its empire rather than in market value. The assumption can be justified in two ways. First, the capital structure choice may be made, prior to a public offering at date 0, by an original owner, who wishes to maximize his total receipts in the subsequent offering of debt and equity (he is about to retire). Second, one can imagine that the firm is all equity prior to date 0, and the threat of a hostile takeover at date 0 forces management to choose a new capital structure which maximizes date 0 market value (the hostile bidder is present now, but may not be around at date 1, so management must bond itself now to act well in the future since otherwise shareholders will sell to the raider).[11]

In the case where there is no ex-ante uncertainty about y_2 and L, the choice of capital structure is simple. If $y_2 > L$, it is optimal to set $P_1 = 0$. If $y_2 < L$, it is optimal to set P_1 very large. (P_2 is irrelevant in both cases.) The return to shareholders is $V_0 = \max (y_1 + y_2, y_1 + L)$ and so the first-best is achieved.

Matters become more interesting if y_2 and L are uncertain. To simplify, let us focus on the special case in which the vector (y_2, L) can take on just two values (y_2^A, L^A) and (y_2^B, L^B), with probabilities π^A and $\pi^B = 1 - \pi^A$, respectively.

Obviously, if $y_2^A \geq L^A, y_2^B \geq L^B$ the first-best outcome can again be achieved with no date 1 debt; if $y_2^A \leq L^A, y_2^B \leq L^B$, the first-best can be achieved with a high level of date 1

11. Both of these scenarios are of course special. We believe that the thrust of our analysis applies also to the case where management chooses financial structure to maximize its <u>own</u> welfare. In the present three-date model, this leads to the trivial outcome of no debt (management clearly prefers not to be under pressure from creditors). However, in a model with more periods management may issue debt voluntarily, since this may be the only way to raise funds from investors concerned that their claims may be diluted if management undertakes bad actions in the future. On this, see Zweibel (1993).

debt. The interesting case is $y_2^A > L^A, y_2^B < L^B$ (or viceversa). It is useful to divide this case into three subcases.

1. $y_1^A + y_2^A > y_1^B + y_2^B$. Here the first-best can again be achieved, for example by setting $P_1 = y_1^A + y_2^A$, $P_2 = 0$. That is, short-term debt is set equal to the total value of the firm in state A. The reason is that the firm can avoid default in state A (by borrowing y_2^A) but not in state B. This is the efficient outcome.

2. $y_1^A + y_2^A \le y_1^B + y_2^B, y_1^A > y_1^B$. Now the first-best can be achieved by setting $P_1 = y_1^A, P_2$ very large. The reason is that the firm can avoid default in state A (by paying y_1^A) but not in state B (since it can't borrow any more). Again, this is efficient.

3. $y_1^A + y_2^A \le y_1^B + y_2^B, y_1^A \le y_1^B$. Now the first-best cannot be achieved. Given any values of P_1, P_2, default in state B occurs if and only if $y_1^B < P_1$ and $y_1^B + y_2^B < P_1 + P_2$ (see (3)). But these inequalities imply $y_1^A < P_1$ and $y_1^A + y_2^A < P_1 + P_2$ and hence default also occurs in state A. It is impossible to have liquidation in state B, where liquidation is efficient, without also having it in state A, where it is inefficient. Thus, the choice is between having liquidation in both states or neither. The first, which can be achieved by setting P_1 very large, is preferable to the second, which can be achieved by setting $P_1 = 0$, if and only if

$$\pi^A L^A + \pi^B L^B > \pi^A y_2^A + \pi^B y_2^B, \tag{4}$$

i.e., if and only if the expected liquidation value exceeds the expected continuation value.

This completes the analysis of optimal capital structure in the two-state case. The main difference relative to the case of perfect certainty is that interior solutions occur: it may be optimal to choose debt levels to take intermediate values (subcases 1 and 2) rather than zero or infinity. Also high debt sometimes leads to inefficient liquidation and low debt sometimes prevents efficient liquidation (see subcase 3).

Before we leave Model 1, it is worth considering again how financial structure differs from an incentive scheme as a way of controlling management. As we noted earlier, since y_1, y_2, L are not verifiable, state contingent incentive schemes are not feasible. Also, an incentive scheme that rewards the manager for liquidating will not be effective given our assumption that the manager puts power before money. However, the following incentive scheme could be useful: the firm's capital structure consists of equity and no debt, the manager is not allowed to raise new capital, and the manager is fired at date 1 unless he pays a dividend to shareholders of at least P^*.

Note, however, that such a scheme yields a liquidation rule

$$\text{Liquidate} \Leftrightarrow y_1 < P^*,$$

which is equivalent to that obtained by choosing debt levels $P_1 = P^*$, $P_2 = \infty$. In general, however, one can do better with a more flexible capital structure; in particular, by setting $P_2 < \infty$ (see subcase 1). The reason is that when $P_2 < \infty$ the liquidation rule

$$\text{Liquidate} \Leftrightarrow y_1 < P_1 \text{ and } y_1 + y_2 < P_1 + P_2$$

depends on y_2 as well as y_1. That is, debt, coupled with the manager's ability to refinance at date 1, yields an outcome that is sensitive to y_2 in a way that is not possible with the simple incentive scheme considered above.[12]

2.2 Model 2 (to expand or not to expand)

Model 1 is concerned with a situation where the only issue is whether the firm should shrink. We now modify the model to allow for the possibility of expansion. This provides a more interesting role for long-term debt as a means of regulating the inflow of new capital.[13]

The time line is as in Figure 1, except that at date 1 the firm may undertake an investment project. The project costs i and yields r at date 2. The variables i and r are uncertain as of date 0, but the uncertainty is resolved at date 1.

Fig. 2

t = 0	t = 1	t = 2
Old assets in place	Old assets yield return y_1 Decision whether to make new investment of size i Decision whether to liquidate and realize L	Old assets yield return y_2 New investment yields return r (if undertaken)

We suppose the manager's empire-building tendencies are such that he always wants to invest if he can. That is, just as the manager wants to avoid liquidation at all costs, so he wants to invest at all cost. The only thing that can stop him is if he can't raise the capital. However, as in Model 1,

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12. We have not allowed investors to send messages about the commonly observed values of y_1, y_2 and L. Messages would be an alternative way of making the liquidation rule sensitive to y_2. See, e.g., Moore (1992).

13. Model 2 is based on Hart and Moore (1994).

once the investment is financed, the manager has no further use for company funds.

We also assume that claims cannot be issued on the return from the investment, r, separately from the return from the assets in place, y_2; that is, we rule out project financing.[14] It turns out that analyzing the case where both liquidation and expansion occur at the same time is complicated, and so we now make an assumption that implies that it is optimal to set $P_1 = 0$, so that liquidation never occurs.

(A1) $y_1 < i$ and $y_2 \geq L$ with probability 1.

(A1) says that the manager can never finance the investment out of date 1 earnings and that it is never efficient to liquidate the firm. The assumption may be plausible for the case of a growth company that, at least initially, requires an injection of new capital to prosper.

In the Appendix, we establish

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14. If project financing were possible, the new investment could be financed as a stand-alone entity, whose merit could be assessed by the market at date 1; and debt levels could be set very high to prevent the manager using funds from the existing assets to subsidize investment. There are several reasons for ruling out project financing. First, it may be that i represents an <u>incremental</u> investment - e.g., maintaining or improving the existing assets - and the final return $y_2 + r$ is simply the overall return from the (single) project. Second, it may be that the same management team looks after both the old assets and the new project, and can use transfer pricing to reallocate profits between them; hence the market can keep track only of total profits. Finally, even if project-specific financing <u>is</u> feasible, it is not at all clear that management will <u>want</u> to finance a project that is not part of their empire since they will not enjoy the private benefits of control (on this, see Li, 1993).

Proposition 1. Assume (A1). Then in Model 2 the date 0 market value of the firm is maximized by setting $P_1 = 0$.

The idea behind Proposition 1 is the following. Given any choice of $(P_1 + P_2)$, it is better to replace P_1 by zero and P_2 by $(P_1 + P_2)$. The reason is that a positive value of P_1 makes inefficient liquidation more likely. Also, a positive value of P_1 never stops the manager from investing in a bad project, since, given that $y_1 < i$, the manager has to go to the market anyway, in which case only the total amount of senior debt in place - $P_1 + P_2$ - matters.

Given that $P_1 = 0$, we can simplify the analysis of Model 2. The firm's total revenue if the manager invests is $y_1 + y_2 + r$, of which P_2 is mortgaged to the old (senior) creditors. Hence, the most the firm can borrow at date 1 is $y_1 + y_2 + r - P_2$. It follows that the manager will invest if and only if

(5) $$y_1 + y_2 + r - P_2 \geq i.$$

If (5) is satisfied, the total return to date 0 claimholders, R, is

(6) $$R = y_1 + y_2 + r - i,$$

of which date 0 creditors receive P_2 and shareholders receive the rest.

If (5) is not satisfied, the total return to date 0 claimholders is

(7) $$R = y_1 + y_2.$$

Notice the two sources of inefficiency in Model 2. Sometimes the manager will invest even though $r < i$, because $y_1 + y_2$ is big relative to P_2. Other times he will be unable to invest even though $r > i$, because $y_1 + y_2$ is small relative to P_2. (The latter is known as the debt overhang problem).

It is now straightforward to analyze optimal capital structure in Model 2. If there is no ex-ante uncertainty about y_2, i and r, it is easy to achieve the first-best outcome. If $r > i$, set $P_2 = 0$; (5) is always satisfied and investment takes place, which is efficient. In contrast, if $r < i$, set P_2 very large; (5) is never satisfied and investment never takes place, which is again efficient.

Matters become more interesting if y_2, r and i are uncertain. To simplify, again suppose that (y_2, r, i) takes on just two values (y_2^A, r^A, i^A) and (y_2^B, r^B, i^B), with probabilities π^A and $\pi^B = 1 - \pi^A$, respectively.

It is again trivial to achieve the first-best outcome with no debt if $r^A \geq i^A$ and $r^B \geq i^B$, or with very large debt if $r^A \leq i^A$ and $r^B \leq i^B$. The interesting case is where $r^A > i^A$ and $r^B < i^B$. We divide this into two subcases.

1. $y_1^A + y_2^A + r^A - i^A > y_1^B + y_2^B + r^B - i^B$. Here the first-best can be achieved by setting P_2 somewhere between $y_1^B + y_2^B + r^B - i^B$ and $y_1^A + y_2^A + r^A - i^A$. (5) is satisfied in state A but not in state B, and investment occurs only in state A, which is efficient.

   In other words, the debt level is set somewhere between the maximized net value of the firm in state A and the maximized net value in state B. This gives management enough leeway to finance a profitable new investment in state A, but prevents the financing of an unprofitable one in state B.

2. $y_1^A + y_2^A + r^A - i^A \leq y_1^B + y_2^B + r^B - i^B$. The first-best is no longer achievable for any choice of P_2. The reason is that

$y_1^A + y_2^A + r^A - P_2 \geq i^A \Rightarrow y_1^B + y_2^B + r^B - P_2 \geq i^B$, and so it is impossible to have investment in state A without also having it in state B. Thus the choice is between having investment in neither state (set P_2 very large) or in both (set $P_2 = 0$). The first is preferable if and only if

$$\pi^A(r^A - i^A) + \pi^B(r^B - i^B) < 0,$$

i.e., if and only if the expected net return from new investment is negative.

The lesson from this second model complements that from the first. If management is interested in empire-building, the danger for investors is that management will try to raise capital for unprofitable investment projects by issuing claims against earnings from existing assets. Long-term debt, by mortgaging part of long-term earnings, reduces management's ability to do this. However, too much long-term debt prevents managers from carrying out even those projects that are profitable.

A notable difference between Model 1 and Model 2 (in the presence of (A1)) concerns the relative importance of short- and long-term debt. In Model 1 short-term debt and long-term debt both have a role (see subcase 2), but short-term debt is crucial since without it liquidation is never triggered at date 1. In Model 2, short-term debt is irrelevant ($P_1 = 0$) and long-term debt has a critical role in regulating the inflow of new capital. In the next model we return to a situation where short-term debt has a primary role.

Before we move on, we should note that throughout this paper we are restricting attention to "simple" capital structures consisting of fixed amounts of senior debt. It is not difficult to show, however, that in some cases more sophisticated securities can be useful. Consider Model 2 and suppose that $y_1 \equiv 0$ and $y_2 \equiv r$ (i.e., the return from assets in place and the return from new investment are always the same). Then the first-best can be achieved in the following way. The firm issues a large class of senior debt due at date 2 in the amount of K, say, with a covenant attached saying that the firm can issue new debt of the same seniority up to a further amount K (so that the total debt outstanding becomes 2K). Any debt beyond this is junior to this class of senior debt.

Given such a capital structure, the most that the firm can raise at date 1 is $\frac{1}{2}(y_2 + r)$. The firm does this by issuing the full amount K of new debt and dividing total date 2 income $(y_2 + r)$ between the old and new creditors (recall that K is very large, so that the firm is bankrupt at date 2). Thus the condition for the firm to invest is now:

$$\text{Invest} \Leftrightarrow \frac{1}{2}(y_2 + r) \geq i$$
$$\Leftrightarrow r \geq i$$

since $y_2 = r$. But this yields precisely the first-best outcome. Moreover, it is easy to check that the first-best cannot be achieved with a simple capital structure consisting solely of (a fixed amount of) senior debt.

Not only are more sophisticated securities of theoretical interest, but also they are observed in practice.[15] Unfortunately, a general analysis of sophisticated securities is beyond the scope of this paper. For some progress in this direction, the reader is referred to Hart and Moore (1994). Note also that the existence of sophisticated securities does not detract from the main theme of this paper: that debt has an important role in constraining the behavior of self-interested management.

15. See Ragulin (1994).

2.3 Model 3

Assumption (A1) was useful in simplifying Model 2, but it ruled out an interesting economic case, stressed particularly by Jensen (1986). If $y_1 > i$, the firm has free cash flow and it may use this to make unprofitable investments (i.e., it may invest when $r < i$). Short-term debt then has a role in forcing the manager to pay out this free cash flow.

Note that this role of short-term debt differs from that in Model 1, where short-term debt was used to trigger liquidation, rather than to prevent expansion.

To analyze this new role of short-term debt, we combine Models 1 and 2 but make two simplifying assumptions. First, we suppose that the manager has an unlimited number of new investment projects (rather than just one) and that they are <u>totally</u> unprofitable, i.e., $r = 0$ for each of them. Second, we suppose that $y_2 > L$, i.e., liquidation is always inefficient (as in (A1)).

(A2) $y_2 > L$ with probability one. Also given any number i, the manager has a new investment project costing i and this project yields $r = 0$.

Given (A2), the role of short-term debt is to force the manager to pay out free cash flow without triggering liquidation.

Consider the manager's situation once the uncertainty has been resolved at date 1. If $y_1 \geq P_1$, the manager can invest $y_1 - P_1$ out of current earnings. However, he may be able to invest more by borrowing. The most he can borrow is $y_1 + y_2 - P_1 - P_2$. It follows that his maximum investment is

$$I = \max\ (y_1 - P_1,\ y_1 + y_2 - P_1 - P_2).$$

Since investment is totally unproductive, it follows that the return to initial security-holders is:

$$R = y_1 + y_2 - I = \text{Min}\ (y_2 + P_1,\ P_1 + P_2).$$

Suppose next that $y_1 < P_1$. Then the manager can avoid default at date 1 if $y_1 + y_2 \geq P_1 + P_2$. In this case he will invest $y_1 + y_2 - P_1 - P_2$ and the return to investors will be $P_1 + P_2$. On the other hand, if $y_1 + y_2 < P_1 + P_2$, default will occur and the firm will be liquidated.

Putting all the cases together, we find that the return to investing is

$$(8) \qquad R = \begin{cases} \text{Min}\ (y_2 + P_1,\ P_1 + P_2) \text{ if } y_1 \geq P_1 \\ P_1 + P_2 \text{ if } y_1 < P_1 \text{ and } y_1 + y_2 \geq P_1 + P_2 \\ y_1 + L \quad \text{if } y_1 < P_1 \text{ and } y_1 + y_2 < P_1 + P_2 \end{cases}$$

We now analyze optimal capital structure in this third model. It is easy to achieve the first-best outcome if there is no ex-ante uncertainty about y_1, y_2 and L. Simply set $P_1 \geq y_1$, $P_1 + P_2 = y_1 + y_2$. Then the manager can't invest since there is no free cash flow; but also he can avoid liquidation (possibly by borrowing).

When there is uncertainty, matters are more complicated. We again simplify by supposing that (y_1, y_2, L) take on just two values (y_1^A, y_2^A, L^A) and (y_1^B, y_2^B, L^B), with probabilities π^A and $\pi^B = 1 - \pi^A$, respectively. If $y_1^A + y_2^A = y_1^B + y_2^B$, the first best can be achieved by setting $P_1 \geq \text{Max}\ (y_1^A, y_1^B)$, $P_1 + P_2 = y_1^A + y_2^A$. The reason is that, as in the case of certainty, there is no free cash flow, but the manager can avoid liquidation in the lower y_1 state by borrowing. So suppose without loss of generality that

(9) $y_1^A + y_2^A > y_1^B + y_2^B$.

We consider two subcases.

Case 1: $y_1^A \leq y_1^B$.

Here the first-best can be achieved by setting $P_1 = y_1^B, P_2 = y_1^A + y_2^A - y_1^B$. In state A, the manager pays the date 1 debt by borrowing $y_1^B - y_1^A$. In state B the manager can repay P_1 out of current earnings. The manager is able to avoid default in both states but has neither the free cash nor the borrowing capacity to make new investments.

Case 2: $y_1^A > y_1^B$.

Now the first-best cannot be achieved. The reason is that for there to be no slack in state A we must have

$$y_1^A + y_2^A \leq P_1 + P_2,$$

$$y_1^A \leq P_1,$$

but then the firm will go bankrupt in state B. There are two basic choices. First (case 2.a), P_1 and P_2 can be set so that bankruptcy is avoided in both states, but some investment occurs in state A. Second (case 2.b), P_1 and P_2 can be set so that no investment occurs in state A, but the firm goes bankrupt in state B.

2.3.1 Avoiding bankruptcy

Consider the first choice, where bankruptcy is avoided in both states. Obviously there is no reason to have slack in state B as well as in state A. There are two ways to achieve this. One is to set $P_1 \geq y_1^A, P_1 + P_2 = y_1^B + y_2^B$, in which case the manager avoids liquidation in state B by borrowing $y_1^B + y_2^B - P_1$, but is able to invest $(y_1^A + y_2^A - y_1^B - y_2^B)$ in state A. That is,

$$I^A \equiv \text{investment in state A} = (y_1^A + y_2^A - y_1^B - y_2^B)$$
$$I^B \equiv \text{investment in state B} = 0,$$

and the expected return to initial security holders is

$$R = \pi^A \ (y_1^A + y_2^A - I^A) + \pi^B \ (y_1^B + y_2^B - I^B) = y_1^B + y_2^B.$$

The second option is to set $P_1 + P_2 = y_1^A + y_2^A$, but to choose $P_1 = y_1^B$, so that the manager can repay his debts without borrowing in state B. In this case,

$$I^A = y_1^A - y_1^B,$$
$$I^B = 0,$$
$$R = \pi^A(y_1^A + y_2^A - y_1^A + y_1^B) + \pi^B(y_1^B + y_2^B) = y_1^B + \pi^A y_2^A + \pi^B y_2^B.$$

Option 1 is preferred to option 2 if and only if it generates a lower value of (totally unprofitable) investment, i.e., if and only if

$$(y_1^A + y_2^A - y_1^B - y_2^B) < y_1^A - y_1^B,$$

which simplifies to $y_2^A < y_2^B$

2.3.2 Triggering bankruptcy

Consider next the second choice, which is to trigger bankruptcy in state B. Under these conditions, it is optimal to set $P_1 = y_1^A, P_2 = y_2^A$ to avoid slack in state A. The return to initial security holders is then

$$R = \pi^A \ (y_1^A + y_2^A) + \pi^B \ (y_1^B + L^B).$$

The final step of subcase 2 is to compare the values of R from avoiding bankruptcy and triggering bankruptcy. The results are summarized in (10) - (12).

(10) If $y_2^A < y_2^B$ and $y_1^B+y_2^B>\pi^A(y_1^A+y_2^A)+\pi^B(y_1^B+L^B)$, it is optimal to set $P_1 \geq y_1^A, P_1 + P_2 = y_1^B + y_2^B$.

That is, total debt is set such that the firm just avoids bankruptcy in state B by borrowing, but the firm has enough debt capacity in state A to make an unprofitable investment.

(11) If $y_2^A>y_2^B$ and $y_1^B+\pi^A y_2^A+\pi^B y_2^B > \pi^A(y_1^A+y_2^A) + \pi^B(y_1^B+L^B)$, it is optimal to set $P_1 = y_1^B, P_2 = y_1^A+y_2^A-y_1^B$.

That is, debt levels are set such that the firm can avoid bankruptcy in state B by paying its short-term debt out of current earnings, but the firm has free cash flow in state A which it can use to make unprofitable investments.

(12) If $\pi^A(y_1^A+y_2^A) + \pi^B(y_1^B+L^B) > \text{Max}\ (y_1^B+y_2^B, y_1^B+\pi^A y_2^A+\pi^B y_2^B)$, it is optimal to set $P_1 = y_1^A,\ P_2 = y_2^A$.

That is, debt levels are set such that the firm just avoids bankruptcy in state A by paying its debts out of current earnings, but goes bankrupt in state B.

This concludes our analysis of Model 3.

3. Observed patterns of capital structure

Having developed some simple models of debt-equity choice, I want to consider next what light these models can throw on actual capital structure choices. A great deal of empirical work has been done on capital structure. Although not all the findings agree, some stylized facts have emerged. I will take these facts as given in what follows.

The stylized facts are that profitable firms have low levels of debt; firms with a large proportion of tangible assets have high debt; firms with stable cash flows have high levels of debt; debt-for-equity swaps raise share prices; equity-for-debt swaps lower share prices; pure equity issues lower share prices.[16]

I shall argue that all of these facts <u>can</u> be explained by the models described above. However, not all are inevitable consequences of these models. In some cases the models predict that reversals could also be observed. Some may regard this ambiguity as a weakness of the agency approach. I suspect, however, that this feature is shared by all theories of capital structure: the point is that a theory's predictions are very sensitive to assumptions made about parameter values and the structure of information.

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16. For discussions of these, see Harris and Raviv (1991); Masulis (1988); Myers (1990); Asquith and Mullins (1986); Kester (1986); Long and Malitz (1985); Masulis (1980); and Titman and Wessels (1988).

Consider the relationship between profitability and debt level. Model 1 can explain why profitable firms (in particular, those with high y_2's) have low debt. Suppose there are two categories of firms, category 1 firms with $y_2 > L$ and category 2 firms with $y_2 < L$, and it is known which category any firm is in. Suppose also that category 1 firms are more profitable than category 2 firms, e.g., because L doesn't vary very much across the categories while y_2 does. Then for profitable category 1 firms, it is optimal to set $P_1 = P_2 = 0$ since liquidation is inefficient. On the other hand, for unprofitable category 2 firms it is optimal to set P_1 large since liquidation is efficient. Thus we obtain a negative relationship between profitability and the debt level.

However, a small change in the assumptions could generate a positive relationship between profitability and the debt level. Suppose that category 1 firms are <u>less</u> profitable than category 2 firms because L varies a lot across the categories, while y_2 does not. In other words, profitable firms are profitable because they have high liquidation values, rather than because they have high going concern values. In such cases, high debt levels will be required to force managers of profitable firms to relinquish control by liquidating them.

Model 2 also does not predict a clear relationship between profitability and debt. If a firm's profitability refers to the value of new investment, it is optimal for profitable firms to have low debt (if $r > i$ for sure, the optimal $P_1 = P_2 = 0$). However, if profitability refers to the value of old investments, then it is optimal for profitable firms to have high debt. In subcase 1 of the two-state case ($r^A > i^A, r^B < i^B, y_1^A + y_2^A + r^A - i^A > y_1^B + y_2^B + y^B - i^B$), the optimal P_2 lies between $y_1^B+y_2^B+r^B-i^B$ and $y_1^A + y_2^A + r^A - i^A$, and is thus increasing in $y_1^B+y_2^B$, $y_1^A+y_2^A$.[17]

Model 3 seems to give a fairly clear prediction that profitability and debt should move together. Take the simplest case where y_1 and y_2 are certain. Then $P_1 = y_1$, $P_2 = y_2$ is optimal and these values of P_1, P_2 are increasing in y_1, y_2.

Consider next the fact that firms with a large fraction of assets that are tangible have high debt. If tangibility is associated with high liquidation value, then Model 1 explains this fact rather clearly. Other things equal, high L's make liquidation more attractive and so raise the optimal P_1, P_2 (it is more likely that $y_2 < L$ or that (4) will be satisfied).

Model 2 seems to have little to say about the relationship between debt and asset tangibility because there is no obvious proxy for asset tangibility in this model.

Model 3, like Model 1, supports the existence of a positive relationship between debt and asset tangibility. Consider subcase 2 of the two-state case ($y_1^A>y_1^B$, $y_1^A+y_2^A>y_1^B+y_2^B$). As L^B rises, it becomes more likely that (12) applies rather than (10) or (11). Since $P_1 + P_2 = y_1^A + y_2^A$ in (12), while it is no greater than $y_1^A + y_2^A$ in (10) and (11), we can conclude that $P_1 + P_2$ rises (weakly) as L^B rises.

Consider next the relationship between debt and the stability of cash flows. The best way to understand this is to consider Model 3. Start off with the case where y_1 and y_2 are certain. We know then that it is optimal to set $P_1 = y_1$, $P_2 = y_2$. Now introduce uncertainty in date 1 cash flows by letting $y_1^A = y_1 + \delta$, $y_1^B = y_1 - \delta$, $y_2^A = y_2^B = y_2$, $\pi^A = \pi^B = \frac{1}{2}$, $L^A = L^B = L$,

17. For more on this, see Hart and Moore (1994).

where $\delta > 0$. Then, according to (10) - (12), if $\frac{1}{2}y_2 - \delta > \frac{1}{2}L$, it is optimal to avoid bankruptcy in both states. One way to do this is to set $P_1 = y_1 + \delta$, $P_2 = y_2 - 2\delta$. In this case it can be said that an increase in uncertainty reduces (total) debt.

On the other hand, if $\frac{1}{2}y_2 - \delta < \frac{1}{2}L$, it is optimal to trigger bankruptcy in state B by setting $P_1 = y_1 + \delta$, $P_2 = y_2$ (see (12)). In this case, an increase in uncertainty increases total debt.

So the theory can explain why firms with stable cash flows have more debt but can also explain the opposite.

We turn next to the event studies. I will focus on the first of these - that debt-for-equity swaps typically raise share prices (a very similar analysis can be applied to the other event studies). I will also base the discussion on Model 1, although similar results could be obtained for the other models. In much of what follows, the driving force behind a recapitalization or swap is the threat of a hostile takeover.

Debt-for-equity swaps typically raise share prices. To see that Model 1 can explain this, suppose that the management obtains private information just after date 0 that a hostile takeover is imminent (it will occur at date $\frac{1}{2}$, say). Assume for simplicity that as far as the market is concerned this is a very unlikely event, so the anticipation of it has no effect on ex-ante market value. However, if the management signals the event through a recapitalization, then the market of course reacts.

Assume also that for unspecified (for example, historical) reasons the firm initially consists of 100 percent equity and that the hostile bid will succeed unless the management can convince the market that it will run the firm approximately efficiently (the idea is that management is safe if it is close to efficient, because there are some costs in making a bid).

Suppose it is known that for this firm $y_1 = y_2 = 100$ and $L = 150$, as in Figure 3. In the absence of any action by the management before a bid is made at date $\frac{1}{2}$, market participants will reason that, if the bid fails, management will <u>not</u> liquidate at date 1 because, given that the firm has no outstanding debt, it will be under no pressure to do so.[18] Anticipating this, shareholders tender to the bidder and the bid succeeds.

To prevent this outcome, the management must bond itself just after date 0 to take an efficient action at date 1. An obvious way to do this is to make a debt-for-equity swap.[19] For example, suppose the management issues new short-term debt promising 250 (that is, sets $P_1 = 250$ and $P_2 = 0$) and uses the proceeds to buy back equity. Because $y_1 < P_1$ and $y_1 + y_2 < P_1 + P_2$, the new debt guarantees that the firm will default at date 1 and be liquidated then, which is the efficient outcome. Thus the hostile takeover is thwarted, and the management retains control, if only until date 1.

Fig. 3

Date 0	Date $\frac{1}{2}$	Date 1	Date 2
Manager learns of existence of hostile bidder	Hostile bid	$y_1 = 100$ $L = 150$	$y_2 = 100$

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18. Assume that the chances of another bidder appearing later are negligible.

19. I assume that it is too late to make such a swap after the takeover bid is announced.

What is the effect of the recapitalization on the value of equity? Before the recapitalization the equity was worth $y_1 + y_2 = 200$. Afterward the total value of the firm is $y_1 + L = 250$. Given that all the capital raised by the new debt is used to buy back shares, all of this 250 accrues to initial shareholders. Thus the effect of the recapitalization is to raise the value of equity by 50.

Model 1 is thus consistent with the apparent fact that debt-for-equity swaps raise the value of equity. However, I now show that, under a different information structure, Model 1 predicts that such swaps can reduce the value of equity.

Debt-for-equity swaps can lower share prices. Suppose that $y_1 = 100$, $L = 80$, and y_2 is known to take on two possible values, $y_2^A = 100, y_2^B = 60$, with probabilities π^A and $\pi^B = 1 - \pi^A$, respectively. Assume that, ex-ante, π^A is very close to 1 and π^B is very close to zero. However, imagine that the management receives private information just after date 0 that in fact state B is sure to occur (the receipt of this information is very unlikely ex-ante). This information will very shortly become available to the market, at date $\frac{1}{4}$, say. In addition everyone already knows that a hostile bid will be made at date $\frac{1}{2}$. Again assume that the firm is initially all equity. The information structure is shown in Figure 4.

Fig. 4

Date 0	Date $\frac{1}{4}$	Date $\frac{1}{2}$	Date 1	Date 2
Manager learns information about the state	Manager's information becomes public	Hostile bid	y_1 realized Liquidation?	y_2 realized (if no liquidation)

Given that, in ex-ante terms, state A is very likely, the management would have no incentive to deviate from the all equity structure in the absence of the information that state B is going to occur (in that case it would adjust its estimate of π^A even closer to 1). The point is that an all-equity firm is under no pressure to liquidate at date 1. But, since π^A is close to 1, this outcome is approximately efficient, so the management is safe from a takeover at date $\frac{1}{2}$. The market's ex-ante valuation of the initial equity is therefore approximately $y_1^A + y_2^A = 200$.

The management, however, knows that the market will soon learn to its surprise that the bad state B is the true state. Given this, the management's job will be in jeopardy unless it can bond itself to liquidate at date 1, since in state B liquidation is efficient.[20] One thing the management can do is to make a debt-for-equity swap. For example, it might set $P_1 = 180$. This commits it to liquidation at date 1 in state B and thus thwarts the hostile takeover at date $\frac{1}{2}$.

Of course, given this information structure, the management's recapitalization signals that it has learned unfavorable information about the state, in particular that state B will occur. The new debt, however, is riskless (because $y_1^B + L^B = 180$) and so sells for 180. Since all of this accrues to initial shareholders, the value of equity when the recapitalization is announced is also 180. This represents a drop in equity value from 200 even though the recapitalization is in security holders' interests. The point

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20. I assume that bonding must occur before the market learns the true state at date $\frac{1}{4}$ and a fortiori before a bid occurs at date $\frac{1}{2}$ (dates $\frac{1}{4}$ and $\frac{1}{2}$ might be very close together).

is that the bad news about the state signaled by the recapitalization offsets the increasing bonding.[21]

Thus, Model 1 can explain not only the apparent fact that debt-for-equity swaps raise the price of equity but also the reverse.

Our overall conclusion, then, is that the agency-based models described in this chapter are consistent with the stylized facts, but not only with these facts.

4. Other theories of capital structure

As we have noted previously, much of the literature on capital structure does not take an agency perspective. In fact, since Modigliani and Miller's famous 1958 irrelevance theorem, the literature has tended to focus on the role of taxes, asymmetric information or incomplete markets as explanations of capital structure decisions, rather than on agency problems. In the last part of this paper, I want to discuss briefly why I think an agency perspective is important and in particular why the conflict of interest between a company's managers and its security-holders is crucial for an understanding of capital structure. A considerably more detailed account of the ideas presented here can be found in Hart (1993).

It is helpful to use Model 1 as a vehicle for this discussion. Maintain all the assumptions of Model 1, except the assumption that the manager is self-interested. In other words, suppose now that the manager obtains no control

21. The idea that a managerial action that serves shareholders can cause a decline in share price because the action reveals bad news about the company is far from new. See, for example, Shleifer and Vishny (1986b).

benefits and therefore is completely indifferent about whether the firm is liquidated at date 1. It is then a simple matter to achieve the first-best with an all-equity capital structure, by putting the manager on the following incentive scheme:

(13) $I = \theta\ [d_1 + d_2]$,

where d_1, d_2 are dividend payments made to shareholders at dates 1 and 2, respectively, and θ is a small positive number. The point is that this motivates the manager to maximize the firm's value (and since θ is small is almost costless for the shareholders). If the manager keeps the firm going at date 1, he receives

(14) $\theta(y_1 + y_2)$,

while, if he liquidates it, he receives

(15) $\theta(y_1 + L)$.

Obviously, the manager will liquidate if and only if $y_2 < L$, which is the first-best outcome.

Not only can the efficient outcome be achieved through an all-equity capital structure with a suitable compensation package for management, but any other capital structure will typically lead to inefficiency. This is clear from our earlier discussion of Model 1. We saw then that the manager cannot avoid liquidation if

(16) $y_1 < P_1$ and $y_1 + y_2 < P_1 + P_2$.

However, if P_1, $P_2 > 0$, (16) may be satisfied when $y_2 > L$, i.e., under weak assumptions, there will be some states where liquidation will occur even when it is inefficient.

A similar argument applied to Model 2 shows that debt is also costly because it prevents the (selfless) manager from carrying out some profitable investment projects (the "debt-overhang problem").

The conclusion so far is that, if managers are not self-interested, firms should not issue debt. However, up to now we have ignored taxes. In most advanced capitalistic economies, interest income on debt is tax-advantaged relative to dividend income. It is often argued that this explains why firms issue debt. In fact, many papers in the literature develop a theory of optimal capital structure based on this idea: debt is good because it reduces corporate taxes, but bad because it may cause inefficient liquidation (when (16) is satisfied).

However, taxes by themselves cannot explain why firms issue debt claims of the type that we have analyzed in this paper.[22] If managers are not self-interested, the first-best can be achieved if the firm issues only postponable debt in the form of payment-in-kind (PIK) bonds.[23] In other words, the firm would owe a large amount of debt P_1 at date 1 and a large amount of debt P_2 at date 2, but the manager would be given the discretion to postpone part of P_1 (in the event that $y_1 < P_1$). The advantage of such an arrangement is that, if P_1 is chosen to be high, the firm can get all the tax advantages of paying income out as interest rather than dividends; but at the same time the manager can avoid inefficient liquidation by postponing $(P_1 - y_1)$ of the current debt owed when $P_1 > y_1$.

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22. In the following discussion I ignore personal taxes. This means that the issues raised in Miller (1977) do not arise.

23. PIK bonds give management the option of paying interest in cash or in additional securities. They were used extensively in LBOs in the US during the 1980s. See Tufano (1993), Bulow, Summers and Summers (1990).

Moreover, the selfless manager will never postpone if liquidation really is efficient, given that he is on the incentive scheme (13). (d_1, d_2 should now be interpreted as combined payments to creditors and shareholders).[24]

A similar argument applied to Model 2 shows that tax considerations cannot explain why firms issue senior (long-term) debt. In particular, if managers issue only junior debt initially (that is, debt with a covenant allowing the firm to issue debt senior to it in the future), then the firm can get all the tax advantages of debt, but at the same time always be able to finance good investment projects later by issuing new, senior debt (i.e., the firm avoids the debt-overhang problem).

In reality, firms issue significant amounts of senior, nonpostponable debt.[25] We may conclude that other forces are at work than simply taxes.

Next, let us consider the role of asymmetric information in explaining debt. Myers and Majluf (1984) have argued that a manager who has private information about a firm's profitability may prefer to issue debt rather than equity. To understand their argument in the context of Model 1, suppose that the manager learns y_2 at date 1, whereas the market learns this only at date 2. Suppose also that for some

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24. Before 1989 US corporations apparently faced few restrictions on their ability to use PIK bonds to wipe out taxable income. Since 1989 the Revenue Reconciliation Act has constrained them. See Bulow et al. (1990).

25. Smith and Warner (1979, p. 122) found that in a random sample of eighty-seven public issues of debt registered with the Securities and Exchange Commission between January 1974 and December 1975, more than 90 per cent of the bonds contained restrictions on the issuing of additional debt. Although the strength of such debt covenants declined during the 1980s, it is still very common for new public debt issues to contain some restrictions on new debt. See Lehn and Poulsen (1992).

(unexplained) historical reason the firm has short-term debt $P_1 > 0$ and that $P_1 > y_1$. Under these conditions a manager who is a significant shareholder, or who acts on behalf of initial shareholders, will issue debt rather than equity to repay P_1 if he learns that y_2 is high. The reason is that, given that the market undervalues the firm's going concern value, the manager would prefer to raise capital by borrowing than by issuing equity since in the latter case initial shareholders' equity (including his own) is diluted.

Note, however, that this effect disappears if the manager is on an incentive scheme such as (13) (and he is forbidden from holding additional shares). Under these conditions his total reward depends only on the firm's ex-post total value - $y_1 + y_2$ or $y_1 + L$ - and not on the split between shareholders and creditors. Thus the manager no longer has any incentive to issue debt rather than equity.[26]

Finally, let us consider the view that firms issue debt in order to "complete" the market.[27] The idea behind this is that risk-averse investors may be interested in holding claims conditional on a firm's profit, other than just shares, in the absence of a full set of Arrow-Debreu securities. The firm can cater to such investors by issuing risky debt as well as equity and can thereby raise its market value.

There are two difficulties with this as a theory of capital structure, however. First, it is not clear why the firm has to issue these more complicated claims itself; other traders in the market can and do issue such "derivative" claims. Second, if the purpose of these claims is solely to

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26. This observation has also been made by Dybvig and Zender (1991). The above discussion does not do full justice to the Myers-Majluf model (or to other asymmetric information theories of debt). For a fuller account, see Hart (1993).

27. See Allen and Gale (1994).

enrich the available investment opportunities, why does a failure to make a payment to creditors trigger the firm's default and bankruptcy, i.e., why don't the claims specify that creditors are owed a fixed amount, but that the firm can pay out less in the absence of a dividend to shareholders (this is exactly the character of a preferred share)? Preferred shares of this type have exactly the same return stream as risky debt if the manager is selfless; however, they have the great advantage that they avoid the inefficiency costs of bankruptcy.

We may sum up this section - and also the paper - as follows. Taxes, asymmetric information and incomplete markets are all undoubtedly important influences on the choice of a firm's capital structure. However, taxes, asymmetric information and incomplete markets alone cannot explain why debt has the feature that a failure to pay leads to a penalty in the form of bankruptcy, i.e., why debt is associated with a "hard" budget constraint. To explain this, it would seem necessary to incorporate agency considerations.[28] That is, it would seem necessary to adopt some version of the approach described in this paper.

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28. A qualification should be made here. Some scholars have argued that even if the management is selfless, senior or secured debt or both may be useful as a way of bonding the firm if it engages in strategic behavior in product markets or in bargaining with unions. See Baldwin (1983); Brander and Lewis (1986) and Perotti and Spier (1993). Although strategic effects may well be important, however, it would be surprising if they alone could explain the widespread use of (senior or secured) debt or the variations in debt across industries, countries, or over time. On the latter, see Rajan and Zingales (1994).

Appendix

Proof of Proposition 1

Consider the situation facing the manager at date 1. The firm's total revenue if the manager invests is $y_1 + y_2 + r$, of which $P_1 + P_2$ is mortgaged to the old (senior) creditors. Hence the most the firm can borrow at date 1 is $y_1 + y_2 + r - P_1 - P_2$. It follows that the manager will invest if and only if

(17) $$y_1 + y_2 + r - P_1 - P_2 \geq i.$$

If (17) is satisfied, the total return to date 0 claim-holders, R, is

(18) $$R = y_1 + y_2 + r - i,$$

of which date 0 creditors receive $P_1 + P_2$ and shareholders receive the rest.

If (17) is not satisfied, the manager will be able to maintain the firm as a going concern as long as

(19) $$\text{either } y_1 \geq P_1 \text{ or } y_1 + y_2 \geq P_1 + P_2.$$

In the first case, the manager pays the date 1 debt out of current earnings, while in the second case, he pays it by borrowing out of future earnings. If (19) but not (17) is satisfied, the total return to date 0 claim-holders is

(20) $$R = y_1 + y_2.$$

Finally, if neither (17) nor (19) is satisfied, the firm is liquidated at date 1 and

(21) $R = y_1 + L.$

It is now easy to see why $P_1 = 0$ maximizes the expected value of R. Only the sum of P_1 and P_2 matters in (17) and the second half of (19). However, a low P_1 is good in increasing the chance that the first half of (19) is satisfied, i.e., minimizing the likelihood of liquidation (liquidation is undesirable since, given $y_2 \geq L$, (20) and (21) imply that R is higher when the firm survives than when it is liquidated).

Q.E.D.

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