CONTRIBUTING SHARES

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The contrast between the complexity and variety of financial structures and securities employed by the modern corporation and the spartan simplicity of the prescriptions of the Modigliani-Miller (1958) and Miller (1977) analyses has led researchers to relax the assumptions of the classical approach, in an effort to uncover the determinants of corporate financing decisions. In addition to taxation and considerations of corporate control and risk sharing, two issues have attracted particular attention; the managerial agency problem that is caused by the inability of shareholders to monitor completely the actions of managers, and the adverse selection problem faced by firms in issuing securities to the public.

Grossman and Hart (1982), Jensen (1986a), Hart and Moore (1990) and Stulz (1990) all assume that management has an incentive to undertake new investment projects even when they are unprofitable, and show how capital structure may be used to limit the problem of managerial agency. Jensen points out that debt reduces managerial discretion over the use of internally generated funds, and Stulz, assuming that shareholders may limit managerial access to external funds, shows how an optimal debt ratio may be obtained by balancing the benefits of unprofitable investments foregone against the costs of foregoing profitable investments for lack of internal finance. Hart and Moore extend the analysis to allow managerial access to external finance and show that debt may also be used to prevent management from raising external funds to finance investment projects with negative net present values. The efficiency of these debt solutions to the managerial agency problem will depend upon the correlation between the cash flows from existing assets and the funding required for profitable investment opportunities.

Myers and Majluf (1985) and others are concerned with the adverse selection problem of a firm that must sell new equity in order to finance an investment project. In order to focus on this problem they ignore the possibility of agency problems between shareholders and managers. Brennan and Kraus (1987) have shown that, in the absence of a managerial agency problem, the Myers-Majluf problem may, under certain circumstances, be resolved by the appropriate choice of financing instrument. In this paper we are concerned with the resolution of the Myers-Majluf problem when there is also a managerial agency problem.

Following Jensen (1986a) and Hart and Moore (1990) we assume that management has a tendency to overinvest - that is, to undertake negative NPV projects even if this is contrary to the interests of current shareholders.[1] Such an assumption makes sense only if there are costs to managers of making low risk zero NPV investments such as purchases of marketable securities, or of returning funds to shareholders by way of stock repurchases or liquidation. Purchases of marketable securities will be negative NPV investments to the extent that the corporation must pay tax on the investment income; stock repurchases have been prohibited in many jurisdictions until recently. It seems likely that there are such costs. Most importantly, a manager may be unwilling to admit that he can find no profitable outlet for the funds at his

[1] Myers and Majluf (1985) in contrast assume that an investment opportunity is discarded if it turns out to have a negative NPV.

command, since this may be an indication of his lack of entrepreneurial skills[2] and have adverse reputational consequences. This view suggests that there may be an important distinction between internally generated funds and funds raised externally, as implied by Jensen. The only reason for the manager not to invest the former is the lack of a profitable opportunity, whereas a manager may refrain from raising new external finance for the perfectly respectable reason that the share price is too low.[3] In this paper we assume that managers will invest internal funds in the best real investment opportunity available, but that they will raise external finance only if it is in the interest of the old shareholders to do so. However, we also assume, consistent with the reputational considerations outlined above, and contrary to Myers and Majluf, that new external finance will be invested in real investment projects even if those projects have negative NPVs. Thus, we take a view intermediate between those of Myers and Majluf on the one hand and Hart and Moore and Stulz on the other; we assume that managers act in the interests of shareholders to the extent that this is consistent with investing all available funds in real investment projects.

Given this setting, we show that it may be efficient for a firm to issue a class of shares that are partly paid, or assessable. Owners of such shares which, in the United States, have been issued primarily by mining companies, are liable to assessments as determined by the board of directors, for amounts up to the difference between the par value and the original purchase price.

[2] See Trueman (1988) for a similar explanation of why mutual fund managers trade.

[3] The free cash flow model of Jensen (1986) implicitly assumes that the manager will not raise external finance to pursue unprofitable growth. Hart and Moore (1990) take the opposite view.

For example, the Delaware Statute states that:

> Any corporation may issue the whole or any part of its shares as partly paid and subject to call for the remainder of the contribution to be paid therefor...Upon the declaration of any dividend on fully paid shares, the corporation shall declare a dividend on partly paid shares of the same class, but only upon the basis of the percentage of the consideration actually paid thereon.[4]

The discretion of the board concerning assessments may or may not be used to favor the interests of the partly paid shareholders, and may be abused, even though investors are protected to some extent by their right to refuse assessments and thereby forfeit their shares[5]. To understand the nature of the possible abuse consider the following scenario. An investor is given an assessable share whose pro-rata share of assets is \$2, and which is assessable for a further \$8. Having received such a gift an unsuspecting investor might well respond positively to a perceived bona fide assessment for a further \$2 since by meeting the assessment he would have an asset worth \$4, whereas by refusing the assessment he would have to forfeit the share. But then, faced with a further assessment for \$2, the investor must choose between losing the amount already contributed and meeting the assessment. It is apparent that an unscrupulous management might thus be able to extract funds from the investor well in excess of the value of the initial gift, and to syphon off those funds by way of perquisites and excessive salaries. Such a

[4] Delaware Law Section 156. Prentice-Hall Corporation Statutes Vol. 3 (1986).

[5] See Bloomenthal (1990).

possibility causes the Securities and Exchange Commission to regard assessable shares, which can be offered pursuant to Regulation A, with considerable suspicion; indeed it treats a **gift** of assessable shares as involving a **sale** of a security[6], and under Rule 136 of the 1933 Securities Act an assessment is treated as an offer for sale which must be registered. This severe attitude on the part of the regulators has made assessable shares virtually unknown in the United States, and Section 23 of the Model Business Corporations prohibits their issuance. However, oil and gas partnerships sold under Rule 133, which are restricted to sophisticated investors, frequently do include provision for the assessment of partners. In Canada, the Canada Business Corporation Act prohibits partly paid shares because "the shareholder is put in a position where he can be forced to put up more money almost at the whim of the issuing corporation or suffer the loss of all or part of what he has already invested"[7]

In Australia in contrast, assessable shares are quite widely used and are known as contributing shares. As of February 1986 there were 56 companies listed on the Australian Associated Stock Exchanges that had contributing shares outstanding. Of these 11 were limited liability companies and 36 were 'no liability' companies[8] which, unlike limited liability companies, cannot enforce assessments, although the shares of shareholders who refuse

[6] See Bloomenthal (1990). Shareholders generally have the right to refuse the assessment and forfeit their shares.

[7] Dickenson at al. (1971, p 38).

[8] The remaining 11 were trustee companies and trusts that invest in the shares of other companies.

assessments are subject to forfeit and auction to pay the assessment[9]. Interestingly, just as assessable shares were used in the US mainly by mining companies, the no liability corporate form in Australia is reserved for oil and mineral exploration firms. In this paper we show that contributing shares may be a useful device for ameliorating the Myers-Majluf (1985) underinvestment problem which, we argue, is likely to be particularly acute for mining exploration firms. On the other hand, their utility is limited by a moral hazard problem that exists on account of the directors' discretion over the call strategy. We show how the shares may be valued for given call strategies, and use data on Australian contributing shares to compare the call strategies anticipated by investors with those followed by the companies. We find some evidence of a conflict between investor anticipations and realized call strategies. However, the call strategies are generally consistent with what we would expect if contributing shares were issued to ameliorate the Myers-Majluf underinvestment problem.

In Section I we show how the right of a company to sell equity at a predetermined price may mitigate the Myers-Majluf problem. In Section II pricing restrictions for contributing shares are derived under different assumptions about the call policy to be followed by the firm. Section III develops a parametric model for valuing contributing shares. Section IV discusses the empirical evidence on the pricing and call strategies for contributing shares in Australia.

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[9] The defaulting shareholders receive any excess of the auction proceeds over the assessment amount.

I

Contributing Shares and Investment Incentives

The adverse selection problem described by Myers and Majluf (1985), that may cause a firm to forego a profitable investment opportunity, may be particularly acute for mining and mineral exploration firms which wish to raise funds to complete an exploration project or to develop an existing property, for then the asymmetry of information between investors and management about the value of prospects is likely to be especially great.[10] In principle, the problem could be overcome by raising sufficient capital to cover any possible future investment outlays at the outset, before the information asymmetry arises; funds that cannot be invested in positive NPV projects could be parked in riskless marketable securities or returned to investors by share repurchase[11]. However, it is clear that such actions constitute an admission on the part of management that it has no positive NPV projects. Management may be reluctant to make such an admission for reputational reasons, and may therefore prefer to undertake a **negative** NPV real investment[12] project rather than to admit the absence of positive NPV projects[13]. In this

[10] See Brennan (1990) for a discussion of information asymmetries in the context of natural resources. Exploration companies may be reluctant to communicate the true value of their prospects for competitive reasons - see Bhattacharya and Ritter (1983).

[11] Share repurchases were prohibited in Australia prior to 1990.

[12] Note that it may be difficult for investors to determine ex-post whether a particular risky investment project had a positive NPV.

case funds that are raised at the outset will be invested in new projects even if they have negative NPV's.[14] Then it becomes important that the incremental funds be provided only when the investment opportunity has a positive NPV, and the preparatory slack solution of Myers and Majluf is no longer costless[15].

In this section we assume that any funds raised will be invested in real opportunities even if they have negative NPV's, and show that contributing shares may provide at least a partial solution to the Myers and Majluf problem. Thus consider a firm that is established at t_0 to explore for a mineral deposit. The exploration program has two phases. The first phase costs I_1 and results in the development, at a possibly random date t_1, of an asset whose value which becomes known only to the managers of the firm at t_1 is denoted by $\tilde{a}$. The second phase of the program starts at t_1 and costs I_2; the net present value of the second phase as assessed at t_1 is denoted by $\tilde{b}$.

We assume that all funds raised are invested in real projects, that the interest rate is zero, and that investors are risk neutral. Then, if the funds for the whole investment program are

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[13] Note that the situation is different when internal finance is not available. Management has the good excuse for not investing that finance is not available on suitable terms - because of the Myers-Majluf problem.

[14] Some anecdotal evidence to this effect is to be found in Jensen (1986b). McConnell and Muscarella (1985) present evidence that oil companies in the 1970's were overinvesting in exploration and development.

[15] Note that the debt solutions of Hart and Moore (1990) and Stulz (1990) to the managerial agency problem of overinvestment ignore the Myers-Majluf problem, in the one case by prohibiting any external finance and in the other by assuming away any information asymmetry.

raised at t_0, both phases of the program will be undertaken for sure and V_0, the value of the firm at $t_{0,}$ before any funds are raised, is given by

$$V_0^* = E_0[\tilde{a} + \tilde{b}] - I_1 \tag{1}$$

where $E_0[\ ]$ denotes expectations conditional on the information available at time 0. Note that this policy is likely to be inefficient since the second stage of the project will proceed even if $\tilde{b}$ is negative. The first best financing solution would ensure that the second phase of the project was undertaken only if $\tilde{b} > 0$. Thus, V_0^*, the value of the firm under the first best policy, is given by:

$$V_0^* = E_0[\tilde{a} + \max(\tilde{b},0)] - I_1 \tag{2}$$

Now consider an alternative financing policy under which the equity funds to finance the firm are raised in two stages, and suppose for simplicity that the firm considers an issue of equity at time t_1 when it has exhausted its first tranche of investment funds, $I_{1,}$ so that it has no financial slack. As in Myers and Majluf[16], the second stage issue decision is assumed to be taken in order to maximize the wealth of the first stage shareholders.

It is reasonable to assume that investors have some information about the first phase of the investment program, and we shall assume that at time t_1 investors receive a noisy signal $\tilde{y}$

[16] Dybvig and Zender (1990) discuss managerial contracts that will induce managers to maximize the value of the firm without regard to the interests of old shareholders.

of the sum of the value of the asset in place and the net present value of the investment opportunity:

$$\tilde{y} = \tilde{a} + \tilde{b} + \tilde{e} \tag{3}$$

where $\tilde{e}$ is a random noise term.

Let P'(y) denote the value of the original equity shares if a new issue of equity is made at time t_1. Then, since the managers are assumed to make the equity issuance decision to maximize the value of the original equity, it follows from the analysis of Myers and Majluf that a new stock issue will be made to fund the required second phase investment I_2 if and only if:

$$\frac{b}{I_2} > \frac{a}{P'(y)} - 1 \tag{4}$$

where P'(y) is defined by:

$$P'(y) = E_0[\ a + b\ |y,\ b > \ I_2(\frac{a}{P'(y)} - 1)]) \tag{5}$$

Condition (4) defines the acceptance region, the values of (a,b) for which it will be optimal from the point of view of the original equityholders to raise capital and invest; for values of (a,b) that fall outside the acceptance region the second phase of the project will be rejected. In Figure 1 the acceptance region for the signal y_i $(i=1,2)$ is the area lying above the line OC_i. Since the acceptance regions include areas for which $b < 0$ and exclude areas for which $b > 0$, it is apparent that the value of the firm under the two stage financing policy is in general less than V_0^*, the firm value under the first best policy[17] - it may even be less than under the preparatory slack policy of raising the whole amount of the potential investment budget, $I \equiv I_1 + I_2$, at t_0, depending on the joint distribution of a and b.

Note that a prior issue of debt as suggested by Stulz (1990) and Hart and Moore (1990) will not alleviate the problem of over- and underinvestment. Thus, supposing for simplicity that riskless debt with a promised payment of D at t_2 has been issued at t_0, the acceptance region would be changed as follows: the line OC_i would rotate in an anti-clockwise direction about its intercept with the a-axis. The effect of this is perverse in that it reduces the size of the acceptance region for $b > 0$, while increasing it for $b < 0$.

To this point we have followed Myers and Majluf in leaving the joint distribution of a and b unspecified. However, in the case of a mineral exploration firm, it is likely that a and b are positively correlated: if the first phase of exploration has been unsuccessful then it is unlikely to be worth investing further funds in exploration or development in the same area. On the other hand, if the first phase has been successful then it is likely that the returns to further investment will be high. To illustrate the potential role of contributing shares in this context we shall consider the extreme case in which the net present value of the new investment project is an exact linear function of the asset in place:

[17] Note that this is true even if management follows the Myers-Majluf convention and never invests in negative NPV projects.

$$b = \alpha + \beta a \tag{6}$$

where $\alpha < -I_2$[18].

This linear relation is represented by the dotted line AB in Figure 1. It is apparent now that for $y = y_1$ no new capital will be raised, even if $b > 0$, whereas for $y = y_2$ the new investment will often be made even if $b < 0$. Thus, as in the models of Stulz and Hart and Moore, inefficiencies caused by both underinvestment and underinvestment may occur. Now suppose that the firm is able to sell new equity at a price which corresponds to a valuation of P^* for the original equity[19], where P^* is chosen so that the ray through O with slope I_2/P^* passes through the point X. Inspection of Figure 1 reveals that $b > 0$ whenever (a,b) falls within the acceptance region defined by the price corresponding to P^*, so that no positive NPV investments are rejected. It is still possible however that if $P'(y) > P^*$ for some y then the second phase of the investment program will be carried out, even when the net present value of doing so is negative. Nevertheless, this will only occur when high signal values are accompanied by low asset values - in other words, only for extreme negative realizations of the signal error. Moreover, under the Myers-Majluf assumption that negative NPV projects are not undertaken, the ability to sell equity at a predetermined price would achieve the first best solution.

Thus the ability of the firm to sell equity at a predetermined price corresponding to P^*

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[18] If $\alpha > -I_2$, then the proposed solution is not available.

[19] For example, if there was only one old share the new shares would be issued at a price of P^*.

may significantly ameliorate the Myers Majluf problem in those cases where investors are not able to evaluate well the value of assets in place and investment opportunities, but where the net present value is highly correlated with the value of assets in place. We have argued that this may not be unrepresentative for many mineral exploration companies which are established to explore a small number of prospects. We shall see in the following section that contributing shares allow the firm to sell equity at a predetermined price and may therefore be a rational contract in such circumstances[20].

[20] It has been suggested to us that warrants play much the same role as do contributing shares in allowing the company to raise equity at a predetermined price. However, warrants allow the firm to sell equity at a predetermined price only when that price is <u>below</u> the current market price, whereas it is evident from Figure 1 that the efficiency gains come from being able to raise equity at a price P^* that is <u>above</u> the current market price $P'(y)$.

II

Restrictions on Contributing Share Prices under Alternative Call Policies

A contributing share is a contingent claim whose payoffs and value depend on the value of the underlying firm and its stochastic process, as well as the policy that is followed by the issuing firm in making a call for contributions. Thus define:

P the price of a contributing share when a fraction (1 - f) of the issue price has been paid[21]

S the price of a fully paid share

$\mathbf{n_1}$ the number of contributing shares outstanding

$\mathbf{n_2}$ the number of fully paid shares outstanding

M the per share par value for both classes of shares

The rules of the Australian Associated Stock Exchange, like the Delaware Statute, require that the dividend paid on the contributing share, d_1, be equal to the product of the dividend paid on a fully paid share and the fraction of the issue price paid to date:

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[21] The issue price is typically the same as the par value of the share. If the issue price is above the par value then f is defined as the fraction of the issue price that has been paid.

$$d_1 = (1-f)d_2 \tag{7}$$

This implies that each contributing share is entitled to a fraction q of the aggregate dividend, where

$$q = \frac{(1 - f)}{(1 - f)n_1 + n_2} \tag{8}$$

Define V as the total value of the firm's equity[22]. Then, assuming that the firm is entirely equity financed,

$$V = n_1 P + n_2 S \tag{9}$$

In the event of a call for contributions, whose timing is at the discretion of the directors of the company, each contributing share will pay the outstanding balance fM[23], and will then own a fraction $1/(n_1 + n_2)$ of the total value of the firm, V, augmented by the new capital raised, $K \equiv n_1 fM$. Therefore the value of a contributing share at the time of call is given by

[22] We shall assume that the firm is financed entirely by equity in the form of contributing and fully paid shares. The issuers of contributing shares considered in this paper make very little use of debt. However, they do issue warrants. For an extension of the anlysis to incorporate warrants see Dunlop (1989).

[23] For simplicity we consider only 100% calls; in reality, the firm may issue a call for less than the outstanding balance.

$$P = \frac{V + K}{n_1 + n_2} - fM \qquad (10)$$

$$= hV - k \qquad (11)$$

where $h \equiv 1/(n_1 + n_2)$ and $k \equiv n_2 fM/(n_1 + n_2)$. Expressions (10) and (11) implicitly assume that the contributing shareholder has an unlimited liability to make contributions if called upon to do so. This is the case with so-called limited liability companies, which are mainly industrial firms. However, owners of contributing shares in so-called "no-liability" companies[24] have the option of not paying the call and thereby forfeiting their shares. In this paper we are concerned exclusively with no-liability companies. Then, taking account of the default option of the shareholder, the value of a contributing share at call is given by:

$$P = \max[hV - k, 0] \qquad (12)$$

Substituting for V from equation (10), and using the definition of q, it may be verified that expression (13) is equivalent to:

$$P = \max[S - fM, 0] \qquad (13)$$

Arbitrage considerations dictate that the value of a contributing share satisfy an upper and a lower bound:

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[24] This corporate form is reserved for oil and mineral exploration firms.

Condition 1

$$P \leq S \tag{14}$$

This upper bound follows immediately from the fact that the contributing share is never entitled to a payoff larger than that of a fully paid share. The lower bound is determined by the consideration that the contributing share cannot sell for less than its pro-rata share of the value of the fully paid share less the value of the contributions remaining to be made. Taking account of limited liability, this gives rise to:

Condition 2

$$P \geq \max[S(1 - f) - fM, 0] \tag{15}$$

In order to derive further restrictions on the pricing of contributing shares it is necessary to make some assumptions about the call policy followed by the issuer. We consider initially three extreme policies - the no-call policy, the value maximizing policy, and the value minimizing policy.

Proposition 1: Under a no-call policy in which no calls are ever made on the contributing shareholders, the value of a contributing share is given by:

$$P - (1-f)S \tag{16}$$

This follows immediately from the observation that the voting and dividend rights of the contributing shareholders are proportioned to the fraction of the issue price that has been paid.

Proposition 2: Under a value-maximizing call policy, in which the call decision is made to maximize the value of the contributing shares,

(i) the value of a contributing share satisfies:

$$P \leq \max[S(1-f), S-fM] \tag{17}$$

(ii) a call is never made if $S < M$.

The first part of the proposition follows from the observation that under a value maximizing policy the value of the contributing share cannot be less than under the no-call policy, or less than if the call were made immediately. The second part follows from the observation that under a value-maximizing strategy the contributing share is equivalent to (1 - f) fully paid shares, plus a perpetual warrant to purchase f shares at an exercise price M: it never pays to exercise the warrant when

$S < M$.

Proposition 3: Under a value-minimizing call policy:

$$\text{(i)}\quad P \leq \min[S(1 - f), \max[S - fM, 0]] \\ = \max[S - fM, 0] - f\max[M - S, 0] \tag{18}$$

$$\text{(ii) No call is made when } S > M \tag{19}$$

The first part of the proposition states that the value under the value minimizing policy can never be more than under the no-call policy, or if a call is made immediately. The second part follows from the observation that under the value-minimizing strategy the contributing share is equivalent to (1 - f) fully paid shares less f put options with exercise price M: it is never optimal to exercise the put when it is out of the money.

The pricing restrictions we have derived for the value maximizing and minimimizing policies implicitly assume that the management is able to employ the funds raised by a call in a zero NPV project such as a share repurchase or an investment in other marketable securities. We suggested in the previous section that management may be reluctant to do this for reputational reasons. If the investment of funds is restricted to real projects and if, as assumed in the previous section, decisions are made in the interest of the old fully paid shareholders, then a call will be made only if $S < M$ **and** the asset-investment opportunity pair falls into the acceptance region of Figure 1. We shall call this a Myers Majluf ("MM") call policy. As the following proposition states, the value of the contributing shares under a MM policy is always less than under the no-call policy.

Proposition 4: Under an MM call policy: