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THE FINANCIAL STRUCTURE OF THE FIRM AND THE PROBLEM OF CONTROL*

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1. Introduction

Much of the theory of corporate finance is concerned with the question of what determines the financial structure of the firm. Beyond explanations based on risk-sharing and taxation, one of the most influential recent theories on this proposes that the main function of the firm's financial structure is to mitigate managerial incentive problems (see for example, Jensen–Meckling (1976); Ross (1977); Grossman–Hart (1982); Townsend (1979); and Gale–Hellwig (1985)). The typical situation described in this literature is one where the manager of a firm has different objectives from those of shareholders or creditors. He must be given incentives to run the firm in the best interest of its investors and this can be achieved, it is argued, by setting up an appropriate financial structure of the firm. Take, for instance, the original version of this theory by Jensen–Meckling. They look at a situation where the manager must be given incentives to both effectively minimize costs and to select investment projects with the right risk/return properties. The ideal incentive scheme for cost–minimization purposes is to let the manager be the residual claimant. This involves 100% debt financing. On the other hand, the best incentive scheme for project selection purposes involves less than 100% debt-financing, since otherwise the manager has incentives to adopt excessively risky projects. Thus, in general, the optimal equity/debt ratio will be strictly positive. Jensen and Meckling have offered a plausible and path-breaking explanation for how firms are financed. As they

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seem to be aware, however, their theory raises some important questions. First and foremost, why use the capital structure as an incentive-scheme when other direct salary–incentive schemes appear to be cheaper? Second, in a more general setting than their's where managers must make decisions about project selection repeatedly over time, why not allow for the possibility that control of the firm might actually be removed from incumbent management? This can be achieved, for instance, if a majority of shareholders votes against incumbent management (possibly on the recommendation of the board of directors or following a takeover). Control can also be removed from the manager if the firm goes bankrupt, in which case it is the creditors who take decisions (about project selection) in the manager's place.

It is remarkable that the existing literature on financial structure (except in the context of takeovers) has ignored issues of control. We believe that it has put too much emphasis on the return-stream characteristics of financial assets and too little on the specific control rights attached to different assets. In Aghion–Bolton (1987) we have attempted to develop a theory of the firm's financial structure based on the problem of allocation of control among the various participants in the firm. At the same time, Harris–Raviv (1987) and Grossman–Hart (1987) have investigated the optimality of one share/one vote in terms of its implications for changes in control via takeovers. All three papers adopt an *incomplete contract* approach to the determination of a firm's capital structure. More recently, Williamson (1988) has also investigated various issues concerning financial structure in this framework. In this paper we wish to examine the merits and weaknesses of this approach and mention some of the new questions that are raised by this theory.

2. Incomplete financial contracts and the problem of control

The notion of control, or ownership, only makes sense in a world of incomplete contracting. If it was costless for contracting parties to write a *complete* contract specifying precise provisions for every conceivable future event then the problem of control (i.e., who has the right to make future decisions concerning the firm) would never arise since all decisions would be made at the time of contracting. But, it is clearly unrealistic to suppose that it is costless to write completely contingent contracts, and if there are contracting costs involved then the parties may prefer to economize on some of these costs by leaving some contingencies out in the initial contract. As soon as some contingencies are left out, however, the question arises of what happens if the parties were ever to find themselves in a state which was left unspecified? One answer may be that whoever owns the firm (or controls it) will make a decision concerning the firm at that point; or else the parties may decide to go to court to settle the dispute, or even to bring in an arbitrator, etc. The point is, the parties will have to specify what Williamson

calls a *governance structure* to deal with unforeseen or unspecified contingencies. In other words, they will have to think about how decisions are to be made in events not covered by the initial contract. Specifying the correct governance structures is all the more important that there may be disagreement among the parties about what the best decision is in those events. The parties to the contract may have conflicting objectives (that cannot be eliminated by the initial contract) for many different reasons. For instance, they may simply have different beliefs about the profitability of specific projects; or else the parties may have private costs or benefits which are not contractible, etc. Various mixes of standard debt or equity contracts implicitly define a given governance structure. For example, if the firm is entirely equity financed, then it is the shareholders who decide what to do in future contingencies left out by the initial contract. Similarly, if the firm is financed via preferred stock, it is the manager who makes all future decisions. More complicated mixtures of other financial instruments (such as debt with various covenants, warrants, convertible bonds, convertible preferred stock, options, etc.) will bring about more sophisticated governance structures. It thus follows that in a world of incomplete contracting the capital structure of the firm can matter, because it induces a particular governance structure and, a priori, there is no reason that all governance structures are equally efficient.

In a world of complete contracting, on the other hand, the Modigliani–Miller irrelevance theorem essentially applies since changes in the mix of debt and equity would not alter the revenue stream generated by the firm (this is true whether there is asymmetric information or not since incentive problems can always be dealt with independently of the financing decision [see Dybvig–Zender (1987)]. In other words, with complete contracting, the firm's production and financial decisions are essentially independent.

It thus seems clear that the way to go is to take incomplete contracting and the problem of control seriously. What is unfortunately much less clear is just how to do this.

Ideally, one would want to explain the particular form of incompleteness of contracts and the precise governance structure adopted as the outcome of an optimization process where the costs and benefits of including an additional contingency in the contract are evaluated at the margin. But, the theory on incomplete contracts in its present form does not allow us to do that, mainly because it is very difficult to define precisely what the costs of writing a more or less complex contract are (see Hart–Holmström (1987) for more on this). Instead, the theory is much less ambitious and starts with reasonable assumptions about what contingencies the contract can cover and what contingencies are necessarily left out. Thus, Grossman–Hart (1987) and Hart–Moore (1988) study extreme forms of contractual incompleteness. Aghion–Bolton (1987) follows basically the same approach, although it allows for contracts based on a wider set of contingencies. The theory of

incomplete contracts is still in its infancy and is based on shaky foundations.[1] It should be clear from the above discussion that major questions still need to be addressed. For example, one of the major puzzles concerning the financial decisions of firms is why the corporate charter of firms can contain highly sophisticated governance structures while at the same time, long-term financial contracts are rather rudimentary and highly incomplete. Despite these methodological weaknesses, we believe that the few recent attempts at introducing an incomplete contract approach to financial decisions have produced valuable insights which are empirically relevant. As a brief illustration of the fruitfulness of the approach, we shall explain how the Jensen–Meckling model can be modified to introduce a problem of control and how a theory of the financial structure of the firm can be formulated in terms of a problem of allocation of control.

3. An example

We shall consider a situation where a risk-neutral entrepreneur–manager must seek outside funding to set up a firm and thus must sign a contract with one (risk-neutral) outside investor. We expand the Jensen–Meckling model by allowing for two periods of production and for repeated project selection decisions. The initial project is selected jointly by the entrepreneur and the investor at the initial contracting stage. Then in the future, new decisions about project selection must be taken, in light of new information about the environment the firm will find itself in. We suppose that the firm can only be financed via a combination of standard equity (i.e., one share/one vote equity contracts), preferred stock, and standard debt contracts.

No other contract can be written between the investor and the entrepreneur. Thus, although the initial capital structure specifies precise revenue-sharing rules, it is incomplete with respect to future project selection. But, then the initial capital structure also induces a particular governance structure which specifies how decisions about future project selection ought to be made. (Our restriction to these standard financial contracts is mainly for illustrative purposes. Aghion–Bolton (1987) looks at the same problem but allows for much more general investment contracts. One of the goals of that paper is to establish the optimality of standard investment contracts in a large class of economic environments, even when more general contracts are available.)

The entrepreneur's objectives are assumed to conflict with those of the

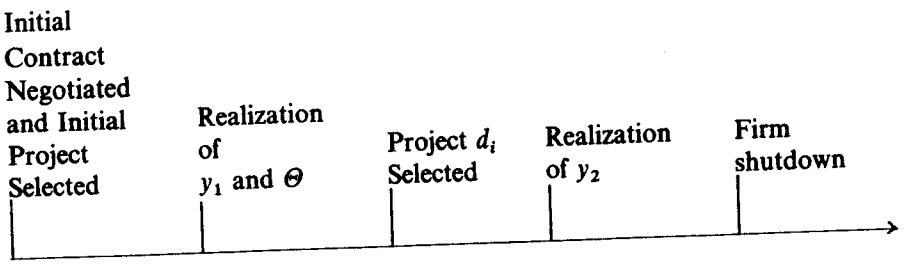
[1]The theory as it stands does not explicitly model contracting costs. Instead, it assumes that certain future events, although anticipated and recognizable ex-post by everyone, are not describable ex-ante. It seems to be contradictory to say that anticipated events cannot be described. In fact, mechanism design theory tells us that nothing prevents parties from writing completely contingent contracts by simply using imperfect descriptions of anticipated events [see Maskin (1977) and Moore–Repullo (1987)].

investor because the entrepreneur cares about private benefits and costs associated with the future projects while the investor only cares about monetary returns. (What we call private benefits is a rather vague notion which may include perquisites, reputational concerns, moral hazard, etc.) The contract between the entrepreneur and the investor does not eliminate these conflicts so that different governance structures may lead to different decisions. Jensen–Meckling only considered one governance structure (where the entrepreneur has an exclusive right to decide about future project selection) but in this set up, there are clearly several others. One obvious alternative is to let the investor decide about future project selection (this is implemented, for example, by financing the firm entirely with standard equity so that the outside investor becomes the majority shareholder). A more interesting and less obvious alternative is to allow for shifts in control from one party to the other as a function of the firm's future performance. For example, if the firm finances part of its initial investment with standard debt, then, if the revenues from this investment turn out to be low enough that the entrepreneur cannot meet his debt repayments, then the entrepreneur must effectively hand over control to the investor.

What are the benefits and costs of these different financial structures? The benefit of giving full control to the entrepreneur (by issuing preferred stock) is that the choice of projects will reflect the latter's private costs and benefits, but at the same time, the costs of this arrangement might be that insufficient weight is put on projects with higher monetary returns. On the other hand, when full control is given to the investor (by issuing standard equity), these costs and benefits are exactly reversed. Debt financing can be viewed as an intermediate case between these two extremes. The optimal financial structure in this context is then given by that structure which maximizes the net benefits from future project selection. Given that the return-stream characteristics of projects and the private benefits associated with them can vary much from firm to firm there can, a priori, be a very diverse set of financial structures. However, within an industry these characteristics of projects are likely to be similar, so that firms ought to have similar capital structures within each industry.

A very simple formal representation of the above example is as follows: Let S be the total cost of the initial project and let y_1 and y_2 represent the revenues from this project in, respectively, periods 1 and 2. Both are random variables (whose realizations are observable and verifiable) with respective densities $f_1(y_1;\Theta)$ and $f_2(y_2;(\Theta;d))$, where the parameters Θ and d denote, respectively, the environment of the firm and some (new) project that will be selected in period 1. We represent the sequence of events in the time-line on the next page.

Next, suppose for simplicity that there are only two possible environments,



a 'good' and a 'bad' one: $\Theta \in \{\Theta_g; \Theta_b\}$. Also, suppose that there are only two projects available in period 1: $\{d_1; d_2\}$.

The entrepreneur's preferences are represented by the utility function $U(I, d_i) = I - l_i$ $(i = 1, 2)$, where I denotes income and l_i represents the private cost from project d_i. The investor's preferences are represented by $V(I, d_i) = I$.

Suppose next that the revenue streams of the two projects satisfy the following two conditions:

$$E[y_2 | d_2; \Theta_g] - l_2 > E\{y_2 | d_1; \Theta_g] - l_1, \tag{1}$$

$$E[y_2 | d_2; \Theta_b] - l_2 < E[y_2 | d_1; \Theta_b] - l_1, \quad \text{and}$$

$$E[y_2 | d_1; \Theta_g] > E[y_2 | d_2; \Theta_g], \tag{2}$$

$$E[y_2 | d_1; \Theta_b] > E(y_2 | d_2; \Theta_b].$$

(Conditions (1) and (2) together imply that $l_1 > l_2$.)

In other words, when the firm's environment is good, the entrepreneur prefers project d_2 while the investor prefers project d_1, and vice versa when the environment is bad. There is, thus, total diagreement here between the two parties.

If a completely contingent contract were available, that contract would specify the project d_2 in the event Θ_g and d_1 in the event Θ_b, since this maximizes the total surplus from the venture. However, such a contract is not available and under standard equity financing, the investor (who is the majority shareholder) would select d_1 *instead* of d_2 in Θ_g. Conversely under preferred stock financing, the entrepreneur would select project d_2 instead of d_1 in state Θ_b. (Preferred stock is like equity without a vote attached to the revenue claim. If the firm is financed with preferred stock, then the entrepreneur is no longer a residual claimant and will put more weight on private benefits than is socially optimal. Here, $l_1 > l_2$ so that if the firm is entirely financed with preferred stock, the entrepreneur puts all the weight on private benefits).

Debt financing involves repayments of R_1 and R_2 in, respectively, periods 1 and 2. If $y_1 < R_1$, the firm goes bankrupt and the creditor takes over. In

other words, if $y_1 < R_1$ the creditor decides what project ought to be selected. (What we mean by project is very general: a project could be to shut down the firm or even to reorganize it.)

Now, take the extreme case where there exists $R_1 > 0$, such that $y_1 < R_1$ only if the firm is in the bad environment, Θ_b, in period 1. Then the creditor takes over only in that event. The advantage of a transfer of control in the event is clear: the entrepreneur always chooses an inefficient project in Θ_b but the creditor who cares more about the monetary returns may select the efficient project. If, on the other hand, the firm is in state Θ_g the entrepreneur remains in control and selects the right project. This is an extreme example of what control contingent on performance can do. Here it permits the implementation of the same projects as the completely contingent contract. In general, this will not be the case, of course, but nevertheless control contingent on performance may make it more likely that the right person is in charge of decision-making.

4. Conclusion

In this short note, we have only touched on a few aspects concerning the financial decisions of firms and their implications for firm performance. We have endeavored to bring out some of the weaknesses of the incomplete contract approach in terms of methodology but also its strengths in terms of empirical relevance. It is not clear whether a fully satisfactory methodology can ever be developed without a theory of bounded rationality. Economists have been expecting the emergence of such a theory for over thirty years. Now the question is, should one postpone research on the implications of the notion of control and ownership pending the development of a complete theory of bounded rationality?

There is no doubt that issues of control are an important element influencing firms' financial decisions. For instance, one often hears owners of companies advocating debt financing instead of equity financing to avoid diluting control. Furthermore, the approach described here could possibly account for the large diversity of assets observed in practice (such as convertible preferred stock, debt with various indentures, etc.). This, however, is not possible in the world of complete contracting traditionally assumed in the finance literature. Finally, the incomplete contract approach provides a first step towards a theory of bankruptcy. It accounts for both reorganization and liquidation; two procedures which are parts of the bankruptcy laws currently in place in most western economies. The important feature of bankruptcy is that it constitutes a transfer of control which does not necessarily lead to liquidation.

This is only a first step towards a theory of bankruptcy since for the moment we do not explain why mechanisms other than bankruptcy are not

used to shift control. Also, we do not account for the existence of conflicts among creditors. Such conflicts are a prevalent phenomenon and bankruptcy law is mainly concerned with their regulation.

Important issues for future research are the incorporation of such conflicts whether between creditors or between shareholders in both closely and widely held firms. Some progress in that direction has recently been made by Grossman–Hart (1987) and Harris–Raviv (1987). Also, much of the existing bankruptcy law needs to be understood and investigated in the context of a model accounting for conflicts among creditors. Finally, a general issue remains, why have a special bankruptcy law at all? (See Aghion–Hermalin (1988) for some answers concerning this issue.)

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