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Financial Contracting

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ABSTRACT

This paper discusses how economists' views of firms' financial structure decisions have evolved from treating firms' profitability as given; to acknowledging that managerial actions affect profitability; to recognizing that firm value depends on the allocation of decision or control rights. The paper argues that the decision or control rights approach is useful, even though it is at an early stage of development, and that the approach has some empirical content: it can throw light on the structure of venture capital contracts and the reasons for the diversity of claims.

"Financial Contracting" might be described as the theory of what kinds of deals are made between financiers and those who need financing. Let me motivate the subject matter of this article with the following questions:

(A) Suppose an entrepreneur has an idea but no money and an investor has money but no idea. There are gains from trade, but will they be realized? If the idea (project) gets off the ground, how will it be financed?

(B) We see companies around the world with a wide variety of financial structures. Almost all companies have owners (i.e., shareholders or equity-holders). Some have other claimants, e.g., creditors, preferred shareholders, etc. Why? Does this matter, for example, for corporate efficiency or investment behavior? What determines a company's debt-equity ratio, that is, the ratio of the market value of its debt to the market value of its equity?[2]

Questions like these have been the focus of much of the very large corporate finance literature that has developed over the last forty years, and they have also been studied in the more recent financial contracting literature. My plan is to summarize some of the older literature (Part I) and then move on to some more recent thinking (Parts II and III). Part I will be deliberately

[2]Post-war, the value of long-term debt of large U.S. corporations has been about half the value of equity. See Franklin Allen and Douglas Gale (2000).

brief and will not do justice to the older literature. Fortunately, there are excellent surveys by Milton Harris and Artur Raviv (1991), Andrei Shleifer and Robert Vishny (1997), and Luigi Zingales (2000) that the reader can consult to supplement what I have to say (the latter two papers also have insightful things to say about the financial contracting literature).

I. Established Views of Financial Structure

The modern Corporate Finance literature starts with the famous Modigliani and Miller (MM) theorem (Franco Modigliani and Merton Miller (1958)). This striking irrelevance result can be paraphrased as follows:

Modigliani-Miller (MM): In an ideal world, where there are no taxes, incentive or information problems, the way a project or firm is financed doesn't matter.

A simple (too simple) way to understand this result is the following. A project can be represented by a stream of uncertain, future cash flows or (net) revenues. Each future revenue is equivalent to some amount of cash today; the exact amount is obtained by applying a suitable discount factor (if the future revenue is uncertain, we might apply a higher discount factor). Now add all the cash equivalents together to obtain the total value of the project–its present value, V, say.

Suppose the project costs an initial amount C. Then the project is worth undertaking if

and only if V > C, that is, if and only if it contributes positive net value. Now we get to MM.[3] The financiers of the project–who put up the C–have to get their C back. They can get it back in a variety of ways: they could be given a share s of future revenues, where sV = C. Or they could get some debt (riskless or risky) that has a present value equal to C. But, however they get it back, they must get C, and simple arithmetic tells us that the entrepreneur who sets up the project will get the remainder V - C. That is, from the entrepreneur's point of view (and from the financiers') the method of financing doesn't matter.[4]

Merton Miller (who sadly died recently) used to illustrate MM with one of Yogi Berra's famous (mis-)sayings: "You better cut the pizza in four pieces because I'm not hungry enough to eat six."[5] Apart from the crumbs, this seems to sum up the proposition pretty well.

MM, although an enormously important benchmark, does not seem to describe the world very well. To give one example of a problem, if MM were empirically accurate, we might expect firms to use no debt or large amounts of debt, or firms' debt-equity ratios to be pretty much random. However, Raghuram Rajan and Zingales (1995) find that similar, systematic factors determine the debt-equity ratio of firms in different countries. In fact, I think that it would be fair to say that, since its conception, MM has not been seen as a very good description of reality; thus, much of the research agenda in corporate finance over the last forty years has been concerned

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[3]Actually the result that the project should be undertaken if and only if V > C can also be thought of as being part of MM.

[4] This informal justification of MM can easily be made rigorous for the case where the entrepreneur and investors are risk neutral. If the parties are risk averse, however, a more subtle, "home-made leverage" argument is required. See Joseph Stiglitz (1974).

[5] See Berra (nd).

with trying to find "what's missing in MM."

Researchers have focused on two principal missing ingredients: taxes and incentive problems (or asymmetric information). In both cases the idea is that, because of some "imperfections," V is not fixed and financial structure can affect its magnitude.

Taxes

The simplest tax story is the following. In many countries, the tax authorities favor debt relative to equity: in particular, interest payments to creditors are shielded from the corporate income tax while dividends to shareholders are not. As a result, it is efficient for a firm to pay out most of its profits in the form of interest–this reduces its tax bill and thus increases the total amount available for shareholders and creditors taken together. (Of course, this increase in firm value is at the expense of society since the treasury receives less tax revenue.)

This simple tax story is too simple: it suggests that we should see much higher debt-equity ratios than we actually do. For this reason, it has been elaborated on in various ways.[6] But extensions of the theory, however ingenious, do not seem to be adequate to explain the data: for example, Rajan and Zingales (1995) find that, while taxes influence debt-equity ratios, other factors are important too.

In fact, in the last few years the literature has focused on a different departure from MM: incentives.

[6]See, e.g., Miller (1977).

Incentive (Agency) Problems

The most famous incentive paper in the corporate finance literature is Michael Jensen and William Meckling (1976). Jensen and Meckling argue that the value of the firm or project V is not fixed, as MM assume: rather it depends on the actions of management, specifically their consumption of "non-pecuniary benefits" (perks). Perks refer to things like fancy offices, private jets, the easy life, etc. These benefits are attractive to management but are of no interest to shareholders–in fact they reduce firm value. Moreover, it is reasonable to assume that they are inefficient in the sense that one dollar of perks reduces firm value by more than a dollar.[7]

Jensen and Meckling use these ideas to develop a trade-off between debt and equity finance. Consider a manager (or entrepreneur) who initially owns 100 percent of a firm. This manager will choose not to consume perks since each dollar of perks costs more than a dollar in market value (and as owner he bears the full cost). Now suppose the manager needs to raise capital to expand the firm. One way to do this is to issue equity to outside investors. However, this will dilute the manager's stake–he will now own less than 100 percent of the firm. As a result, he will consume perks, since the cost of these is borne at least partially by others. As noted, this is inefficient since total value (firm value plus the value of perks) will fall.

Alternatively, suppose the manager borrows to raise capital. At least for small levels of debt, this does not dilute the manager's stake. The reason is that the debt must be paid back for sure (it is riskless), which means that, in a marginal sense, the manager still owns 100 percent of

[7]This assumption makes sense since managers can typically consume perks only in quite narrow ways; that is, if unconstrained, they might prefer to spend an extra dollar on their children's education rather than a fancy office, but the former would look suspicious whereas the latter can be defended (to shareholders and society).

the firm (his payoff is V - D, where D is the value of the debt). As a result, he bears the full cost of perks and will not take them.

So far it looks as if borrowing is an efficient way to raise capital. However, Jensen and Meckling argue that borrowing becomes costly when debt levels are large. The debt then becomes risky, since there is a chance that it won't be repaid. At this point, the manager will have an incentive to gamble with the firm's assets, e.g., engage in excessively risky investments. The reason is that, if an excessively risky project succeeds, the firm's profits are high and the beneficiary is the firm's owner–that is, the manager himself (recall that he has 100 percent of the equity); whereas if the project fails, the firm's profits are low and the losers are the firm's creditors since the firm is bankrupt.

According to Jensen and Meckling, the optimal debt-equity ratio or capital structure for the firm is determined at the point where the marginal benefit of keeping the manager from taking perks is offset by the marginal cost of causing risky behavior.

The effects that Jensen and Meckling emphasize are clearly important. However, their analysis has a theoretical shortcoming. The incentive problem that Jensen and Meckling focus on is what economists call an agency problem, i.e., a (potential) conflict of interest between an agent who takes an action (in this case, the manager choosing the level of perks) and a principal who bears the consequences of that action (other shareholders or creditors). There is a large economics literature on agency problems, but the main finding from that literature is that the best way to deal with them is to put the agent on an optimal incentive scheme.

An illustration may be helpful. Suppose you (the principal) hire me (the agent) to sell silverware; my job is to drive around the suburbs, knocking on people's doors, and trying to

interest them in knives and forks. You may be worried that I will sit in my car listening to rap music and not selling your product. One solution is to pay me a fixed amount per set of silverware I sell (a piece-rate) rather than a fixed wage per hour. (Or you might use a combination of the two.)

Applying this logic to the present context leads to the conclusion that the manager's salary should be geared to firm performance, that is, the manager should be put on an incentive scheme, $I = f(V)$, where V is firm market value. But this can be done independently of the firm's financial structure, that is, independently of whether the manager is a shareholder. (In the silverware example, I did not have to become a shareholder of the silverware firm to work hard.) Moreover, given an optimal incentive scheme, the manager's preference for borrowing rather than issuing shares disappears.[8]

In other words, a question unanswered by Jensen and Meckling's analysis is: why use financial structure rather than an incentive scheme to solve what is really just a standard agency problem?

Before we move on, it is worth mentioning another strand of the agency literature that focuses on private information possessed by managers rather than managerial actions. (This part of the literature corresponds to the adverse selection version of the moral hazard problem studied by Jensen and Meckling.) A leading example of this literature is Stewart Myers and Nicholas Majluf (1984). Like Jensen and Meckling, Myers and Majluf consider a manager who needs

[8] This point is elaborated on in Philip Dybvig and Jaime Zender (1991). Paying the manager according to total market value V has the drawback that the manager may have an incentive to invest in unprofitable projects in order to raise V. This problem can be overcome by deducting the capital raised from V before assessing the manager's salary, i.e., paying the manager according to value net of investment cost.

capital to expand the firm. Myers and Majluf ignore perks, but suppose that the manager has better information about the profitability of the existing firm, i.e., assets in place, than investors. In particular, imagine that the manager knows that these are worth a lot, whereas investors do not. Then, if the manager acts on behalf of current shareholders (e.g., because he holds equity in the firm himself), he will not want to raise capital by issuing new shares. The reason is that the new shares will be sold at a discount relative to their true value, which dilutes the value of the current shareholders' stake.

Instead the manager will raise capital by issuing (riskless) debt. Riskless debt will not sell at a discount–the firm will simply pay the market interest rate on it. Hence no dilution will take place. Thus Myers and Majluf provide another reason why MM fails: if managers have superior information, they will want to sell new securities whose return is insensitive to this information (riskless debt being the most insensitive security of all).

Myers-Majluf are surely right that private information is an important determinant of financial structure, and the effect that they identify appears to be empirically significant. However, their analysis suffers from the same theoretical weakness as Jensen-Meckling. Financial structure matters only because managers are (implicitly) on a particular kind of incentive scheme. Specifically, Myers and Majluf assume that managers act on behalf of current shareholders, e.g., because they hold equity themselves. But things don't have to be this way. Suppose managers were paid a fraction of the firm's total market value V. Then managers wouldn't worry about selling new shares at a discount, since any loss in current shareholder value is offset by a gain in new shareholder value and managers are paid on the basis of the sum of the two. With this incentive scheme, managers are happy to expand by issuing new equity and financial structure no

longer matters.[9]

II. Financial Contracting Literature: Decision and Control Rights

We have seen that incentive (agency) problems alone do not yield a very satisfactory theory of financial structure. The recent financial contracting literature (developed in the last fifteen years or so) adds a new ingredient to the stew: decision (control) rights.[10]

This literature takes as its starting point the idea that the relationship between an entrepreneur (or manager) and investors is dynamic rather than static. As the relationship develops over time, eventualities arise that could not easily have been foreseen or planned for in an initial deal or contract between the parties. For example, how many people in 1980 could have anticipated the fall of the Soviet Union or the rise of the Internet in the 1990s? In an ideal world,

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[9]There is in fact a strict advantage to putting managers on an incentive scheme that rewards them according to total shareholder value, rather than current shareholder value. As Myers and Majluf show, the latter scheme may cause managers to turn down some profitable new projects, because the dilution effect on current shareholder value will be so great that they prefer not to invest. This inefficiency is avoided if managers are rewarded according to total shareholder value.

John Persons (1994) argues that an incentive scheme where managers are paid a fraction of the firm's total market value is not "renegotiation-proof": the board of directors (acting on behalf of current shareholders) will always revise it. However, Persons does not explain why the board acts on behalf of current shareholders or why the board is given the power to revise the managerial incentive scheme.

[10]This recent literature should be contrasted with an earlier literature based on costly state verification; see Robert Townsend (1978) and Gale and Martin Hellwig (1985). In this earlier literature, an optimal contract between an entrepreneur and investor was analyzed under the assumption that a firm's profitability is private information, but that this information can be made public at a cost. This earlier literature did not stress contractual incompleteness (as defined below) or focus on the role of decision (control) rights.

a contract between a computer manufacturer (IBM, say) and a software producer (Microsoft), written in 1980, would have included a contingency about what would happen if the Internet took off–or for that matter would have had a clause guarding against Microsoft from becoming the dominant supplier of operating systems. In practice, writing such a contingent contract would have been impossible: the future was simply too unclear.

Economists (and lawyers) use the term "incomplete" to refer to a contract that does not lay out all the future contingencies. A key question that arises with respect to an incomplete contract is: how are future decisions taken? That is, given that an incomplete contract is silent about future eventualities, and given that important decisions must be taken in response to these eventualities, how will this be done? What decision-making process will be used?

It might be helpful to give some examples. Consider a firm that has a long-term supplier. Advances in technology might make it sensible for the firm instead to buy its inputs on the Internet. Who makes the decision to switch?

Or take a biotech firm that is engaged in trying to find a cure for diabetes. The firm has been pursuing a particular direction, but new research suggests that a different approach might be better. Who decides whether the firm should change strategy?

Other examples concern whether a firm should undertake a new investment, whether the firm's CEO should be replaced, or whether the firm should be closed down.

The financial contracting literature takes the view that, although the contracting parties cannot specify what decisions should be made as a function of (impossible) hard-to-anticipate-and-describe future contingencies, they can choose a decision-making process in advance. And one way they do this is through their choice of financial structure. Take equity. One feature of

most equity is that it comes with votes. That is, equity-holders collectively have the right to choose the board of directors, which in turn has the (legal or formal) right to make key decisions in the firm–specifically, the kinds of decisions described above.

In contrast, take debt. Creditors do not have the right to choose the board of directors or to take decisions in the firm directly. However, they have other rights. If a creditor is not repaid, she can seize or foreclose on the firm's assets or push the firm into bankruptcy. Moreover, if the firm enters bankruptcy, then creditors often acquire some of the powers of owners.

A rough summary is that shareholders have decision rights as long as the firm is solvent, while creditors acquire decision rights in default states.

It is worth emphasizing the difference between this perspective and that described in Part I. According to MM, the firm's cash flows are fixed and equity and debt are characterized by the nature of their claims on these cash flows: debt has a fixed claim while equity gets the residual. In Jensen and Meckling, the same is true except that now the allocation of cash flow claims can affect firm value through managerial incentives. In neither case do votes or decision rights matter. In contrast, in the financial contracting literature, decision rights or votes are key, even though, of course, as we shall see, cash flow rights matter a lot too.

It is also worth noting that there is an important distinction between the kinds of decisions we are talking about here and the managerial actions we discussed in the context of Jensen-Meckling. Managerial actions, e.g., the level of perks or effort, are usually assumed to be nontransferable (or hard to transfer): only the manager can choose them. In contrast, decision rights are (more easily) transferable: e.g., the decision about whether to replace the CEO, say, can be taken by one party (shareholders) or by another party (creditors). Hence, a key design

question is: how should decision rights be allocated in the initial contract/deal between the parties? To this we now turn.

The Allocation of Decision Rights

The financial contracting literature has tended to focus on small entrepreneurial firms–rather than a publicly traded company or corporation–and we will do this too for the moment. To make things very simple, consider a single entrepreneur, a single investor, and a single project. The question is, how should the right to make future decisions be allocated between the entrepreneur and the investor? Who should have the right to replace the CEO or terminate the project?

In order to answer this question, we obviously need a theory of why the allocation of decision-making authority matters. Various possibilities have been advanced. One approach is based on the idea that decision rights are important for influencing asset- or relationship-specific investments. Suppose individual i is considering whether to invest resources in learning about how to make the project more profitable. If he controls the project, and has a good idea, he can implement this idea without interference from anyone else. This gives him a strong incentive to have an idea. On the other hand, if someone else controls the project, i will have to get permission from this other person and may have to share the fruits of his idea with them; this will dilute his incentives.

The above approach has been used in the theory of the firm[11] but has been employed less in the financial contracting literature. Instead, in this latter literature, researchers have focused on

[11]See Sanford Grossman and Hart (1986), Hart and John Moore (1990), and Hart (1995).

how the allocation of control rights affects the trade-off between cash flows and private benefits once the relationship is underway.

The best known paper adopting this approach is Philippe Aghion and Patrick Bolton (1992).[12] Aghion and Bolton assume that the project yields cash flows in the amount of $V and private benefits in the amount of $B. Private benefits are similar to the non-pecuniary benefits discussed in Jensen-Meckling; although private benefits may represent things like psychic value, we suppose that they have a cash equivalent, i.e., they can be measured in dollars. The investor is interested only in cash flows, while the entrepreneur is interested in both cash flows and private benefits. These different interests create a potential conflict between the entrepreneur and investor.

Since private benefits (like decision rights) are very important in what follows, it may help to illustrate them. Consider an entrepreneur who has developed an idea for a project. The entrepreneur is likely to get some personal satisfaction from working on the project, or from the project succeeding, that is over and above any cash flows received. Also, if the project succeeds, the entrepreneur's reputation is enhanced and he will do better in future deals. Personal satisfaction and reputational enhancement are both examples of private benefits since they are enjoyed by the entrepreneur but not the investor.

Some private benefits are less innocuous. Someone who controls a project can decide who will work on the project; the controller may choose to appoint relatives or friends to key positions even though they are incompetent ("patronage"). The controller may also be able to

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[12]For related work, see Bolton and David Scharfstein (1990), Douglas W. Diamond (1991), Hart and Moore (1994) and Hart and Moore (1998).

divert money from the project, e.g., he can set up other firms that he has an ownership interest in, and choose the terms of trade between the project and these firms to suck cash out of the project. Patronage and diversion are also examples of private benefits.

As noted, the existence of private benefits introduces a potential conflict of interest between the entrepreneur and the investor. How is this conflict resolved? The answer is that this depends to a large extent on who has the right to make decisions once the relationship is underway.

To understand this, consider a simple case where the entrepreneur is allocated a fraction θ of the project cash flows and the investor receives the remaining $(1 - \theta)$. Suppose that the project is set up at date 0 and all decisions are taken and benefits earned at date 1. The date 1 objective functions of the entrepreneur and investor are then as follows:

Entrepreneur: $\text{Max } B + \theta V$

Investor: $\text{Max } (1 - \theta)V \equiv \text{Max } V$

It is also useful to write down the objective of a planner who is concerned with social (or Pareto) efficiency. In a first-best world where lump sum distributions are possible the planner would maximize the sum of the entrepreneur and investor's payoffs (since both are measured in money), i.e., social surplus, $B + V$.

Social Planner: $B + V$

It is clear that these three objective functions are generally distinct. This suggests that it will indeed matter whether the entrepreneur or the investor makes ex post decisions. (The planner is a mere construct and so will not have decision-making authority!)

For example, suppose the only decision to be made concerns whether the project should be terminated or continued (at date 1). Assume that E's private benefit from continuation is $100, but that $200 in resources can be saved if the project is terminated now rather than later. Also assume $\theta = .1$.

From a social surplus or efficiency perspective, the project should be terminated (the $200 loss exceeds the $100 private benefit and social surplus is represented by the sum of these). This outcome will be achieved if the investor makes the decision since she puts no weight on private benefits, but not if the entrepreneur does (given his stake of 10 percent, he gains only $20 from avoiding losses, but loses his full private benefit of $100).

On the other hand, suppose that the losses from continuation are $80 rather than $200. Now it is efficient to continue the project, and this time efficiency will be achieved if the entrepreneur has decision-making authority, but not if the investor does (since the investor is concerned only with loss avoidance).[13]

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[13]We have not considered renegotiation. Suppose the losses from continuation are $200. We saw that if the entrepreneur has control at date 1, he will keep the firm going even though this is inefficient. However, one thing the investor could do is to offer the entrepreneur a payment in return for closing the firm down. The entrepreneur requires at least $80 to make this worthwhile and the investor is prepared to offer up to $180–so presumably something in this range will be agreed upon. Similarly, if the losses from continuation are $80, and the investor has control, the entrepreneur--if he has the money--could pay the investor an amount between $72 and $92 to persuade her not to close the firm down.

In fact, in a world of perfect renegotiation, the famous Coase theorem tells us that the allocation of decision rights doesn't affect the date 1 outcome at all: the parties will always arrive

Consider the issue of contract design at date 0. The parties have two instruments at their disposal: the allocation of cash flow rights, represented by θ, and the allocation of control rights. (For simplicity, we have assumed that the parties share cash flows in a linear manner, but nothing significant depends on this–the investor could hold convertible, preferred stock, for example.) For simplicity assume that the entrepreneur makes a take-it-or-leave-it offer to the investor at the contract-signing stage. Suppose also that both parties are risk neutral. Then the entrepreneur will choose the contract to maximize his expected payoff subject to the investor breaking even, i.e., recovering her investment cost C (on average).

A simplification can be made. Since the investor's gross expected return is fixed at C, an optimal contract will also maximize the sum of the entrepreneur and investor's payoffs, i.e., (expected) social surplus, B + V, subject to the investor breaking even. It follows that, given two contracts, both of which have the investor breaking even, the one that generates greater expected social surplus is superior.

It is useful to consider two polar contracts. At one extreme, suppose the entrepreneur has all the cash flow rights ($\theta = 1$) and all the decision rights. Then the entrepreneur's objective

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at the efficient outcome through bargaining. However, in the present context, there is an important impediment to renegotiation: the fact that the entrepreneur is wealth-constrained. (Presumably this is why the entrepreneur approached the investor in the first place. If he was not wealth-constrained, he could have financed the project himself.) Thus, while it may be relatively easy for the investor to bribe the entrepreneur to make a concession when the entrepreneur has control, it is harder for the entrepreneur to bribe the investor to make a concession when the investor has control. In fact we have implicitly assumed that the entrepreneur has no wealth, so that the only item of value he can offer to give up is his fraction θ of V; this may not be enough to achieve efficiency. Note that he can't give up B directly because B is a non-transferable private benefit.

Since renegotiation complicates the basic story, without changing the fundamental message that the allocation of control matters, I will ignore it in what follows.

function and the social planner's coincide, which means that an efficient outcome is guaranteed. Unfortunately, the investor gets none of her money back! Thus, this contract is not feasible.

At the other extreme, suppose that the investor has all the cash flow rights ($\theta = 0$) and all the decision-making rights. This contract maximizes the investor's payoff and so the investor will more than break even–or at least, if she doesn't, the project can never go ahead at all. Unfortunately, this contract may lead to the destruction of significant private benefits since the investor puts all the weight on cash flows. Note that this contract has a simple interpretation: the entrepreneur is a paid employee–he has no formal authority and gets a flat wage (actually zero!).

The question is, where between these two extremes does the optimal contract lie?

There is one case where there is a simple answer. Suppose that, <u>whatever</u> decision is taken at date 1, the project yields a cash flow that is at least C (discounted back to date 0). Then the investor can be given riskless debt with value C and the entrepreneur can be allocated all the equity, i.e., he is the residual income claimant and has all the decision rights. This contract is feasible because the investor breaks even and optimal because there is no inefficiency: the entrepreneur maximizes B + V.[14]

Unfortunately, in a world of uncertainty, it is unlikely that the project cash flows will be large enough to support riskless debt of value C given any decision. In order to understand what is optimal then, imagine that the parties can anticipate–and contract on–certain events at date 1

[14]Note the importance of the condition that the project yields at least C whatever decision is taken. For riskless debt to be optimal, it is not enough to suppose that the project can always generate C ex post if <u>some</u> decision is taken; such a decision might involve project termination, say, and the destruction of significant private benefits. In this case, it may be better to allocate decision rights on an event-contingent basis, as described below.

(they are verifiable).[15] An example of an event might be a situation where the firm has low earnings, and its product is not selling; in another event the opposite may be true–the firm has high earnings, and its product is selling.

The advantage of allocating cash flow and control rights to one party or the other will typically differ across these events. For example, in one event it may be the case that a ruthless strategy of value (cash flow) maximization leads to an approximately efficient outcome because private benefits aren't very important. Recall the example where closing the firm down saved $L and wasted a private benefit of $100. If L = 200, then indeed value maximization generates an efficient outcome.

On the other hand, in other events, private benefits may be relatively more important, and value maximization may cause a significant loss of social surplus. This would be the case in the same example if L = 80.

Aghion and Bolton show that the investor should have control–and cash flow rights–in the first kind of event, and the entrepreneur should have control–and also possibly cash flow rights–in the second kind of event. The reason is that giving the investor control and cash flow rights in the first kind of event generates an approximately efficient (social surplus maximizing) outcome and makes it easier to satisfy the investor's break-even constraint; while giving the entrepreneur control in the second kind of event prevents inefficiency and hence is desirable as long as it is consistent with satisfying the investor's break-even constraint. (Giving the entrepreneur cash flow rights in the second kind of event may be useful to bring the entrepreneur's objective function in

[15]An event is a subset of the set of all possible states of the world (i.e., all possible contingencies).

line with the social objective function.)

A very rough summary of the Aghion-Bolton model is thus the following. If we rank events from those where ruthless value maximization is least inefficient to those where it is most inefficient, then the investor should have control in the first set and the entrepreneur in the second set, where the cut-off is chosen so that the investor breaks even.

How good a job does the Aghion-Bolton model do in explaining the features of real-world financial contracts? An interesting recent paper by Steven N. Kaplan and Per Stromberg (2001) argues that a good place to look is the venture capital sector (see also Paul Gompers (1997)).[16] Venture capitalists are private providers of equity capital for young growth-oriented firms (high-tech start-ups). Although venture capitalists often represent several large rich individuals or institutions, they correspond quite well to the single investor of the Aghion-Bolton model. Similarly, the founder or founders of a start-up company can be represented without too much of a stretch by a single entrepreneur. The distinguishing feature of venture capital deals is that the major participants have a close relationship and are few in number.

Kaplan-Stromberg study 213 venture capital (VC) investments in 119 portfolio companies (firms) by 14 VC partnerships. Most of these firms are in the information technology and software sectors, with a smaller number being in telecommunications. Kaplan-Stromberg's main findings (from our point of view) are the following:

(1) VC financings allow the parties to allocate separately cash flow rights, voting rights, board rights, liquidation rights, and other control rights.

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[16]For related work on biotechnology alliances, see Joshua Lerner and Robert Merges (1998).

(2) Cash flow rights, voting rights, control rights, and future financings are frequently contingent on observable measures of financial and non-financial performance. For instance, the VCs may obtain voting control or board control from the entrepreneur if the firm's EBIT–earnings before interest and taxes–falls below a pre-specified level or if the firm's net worth falls below a threshold. Also, the entrepreneur may obtain more cash flow rights if the firm receives approval of a product by the Federal Drug Administration (FDA) or is granted a patent.

(3) If the firm performs poorly, the VCs obtain full control. As firm performance improves, the entrepreneur retains/obtains more control rights. If the firm performs very well, the VCs retain their cash flow rights, but relinquish most of their control and liquidation rights. The entrepreneur's cash flow rights also increase with firm performance.

(4) VCs have less control in late rounds of financing (i.e., when the project is close to completion).

At a broad level, these findings fit very well with the Aghion-Bolton model. First, as that model emphasizes, cash flow rights and control (decision) rights are independent instruments, and indeed they are used independently: someone may be allocated significant cash flow rights without significant control rights and vice versa. (To put it another way, there can be a substantial deviation from one share-one vote.) Second, as the Aghion-Bolton model predicts, to the extent that different events can be identified, the allocation of cash flow rights and control rights will depend on these; here the events correspond to performance as measured by such things as earnings, net worth, or product functionality (FDA or patent approval). Third, the fact that VCs have fewer control rights in late financings can be understood as follows. In late financings, a firm

requires less cash relative to future profitability, i.e., the investment cost C is, in effect, lower. As we have seen, this makes it more likely that the project cash flows can support something like riskless debt, in which case an efficient outcome can be achieved by giving all the control rights and residual income rights to the entrepreneur. Under these conditions there is no gain–and there can be a considerable loss–from allocating control rights to the investor.

Interestingly, there is one striking finding of the Kaplan-Stromberg study that, although consistent with the Aghion-Bolton model, does not necessarily follow from it. This is that control rights and cash flow rights shift to the VC if the firm does poorly. (Number 3 in the above list.) This makes perfect sense if we can identify poor performance with an event where ruthless value maximization leads to an approximately efficient outcome, e.g., because private benefits aren't very important relative to cash flows.[17] And indeed, this is quite plausible, in the sense that in bad events it may be efficient that the project be terminated or the entrepreneur removed as CEO and this is exactly what a ruthless value maximizer would do.

However, things do not have to be this way. It could be that ruthless value maximization leads to an efficient outcome in good events. For example, imagine that, if a start-up is very successful, the founding entrepreneur is no longer the best person to run it, e.g., because his creativity gets in the way of the professional approach to management that is now desirable. If the losses from keeping the entrepreneur on are high enough, then it is efficient to replace him. However, the entrepreneur may resist replacement given his private benefit. Under these conditions, the only way to obtain an efficient outcome is to put control in the hands of the VC.

In other words, this is a case where the VC should have control if the firm performs well,

[17] For a set of conditions guaranteeing this, see Hart and Moore (1998).

since it is in good events that cash flows are important relative to private benefits.

As noted, Kaplan-Stromberg do not find this effect in the data, but the question is why? Possibly the answer is that the Aghion-Bolton model ignores an important variable: effort. That is, in reality, private benefits B and cash flows V are a function of ex ante effort as well as ex post decisions. An entrepreneur may have little incentive to work hard to ensure that a good event occurs, i.e., V is high, if his reward is to be replaced by a ruthless investor.[18] In other words, ex ante effort considerations may explain why, empirically, control shifts to the investor in bad rather than good events.

III. Costly Intervention and the Diversity of Outside Claims

In Part II, we discussed how control should be divided between an insider (the entrepreneur) and an outsider (the investor). However, in many large companies in countries like the U.S., the U.K., or Japan, insiders, as represented by the board of directors or management, do not have (voting) control in any state of the world. Rather control rests with dispersed outside investors. Moreover, those outsiders hold diverse claims: some are shareholders and others are creditors.

In this section we discuss what may be responsible for the diversity of outside claims. We will argue that diversity can be understood as part of an optimal mechanism when intervention by an outside investor is costly (that is, the investor has to expend time or resources to exercise control). Before we get into the details of the analysis, it is worth emphasizing that neither the

[18] The entrepreneur may also have an incentive to manipulate the accounts ex post, to make a good event look like a bad one, if he is likely to be replaced in a good event (e.g., he could throw away money).

agency approach of Section I nor the control rights model of Section II bears directly on this question. The agency approach, as we have already argued, is really a theory of optimal incentive schemes rather than capital structure; while the control rights model helps to explain the optimal allocation of control between insiders and outsiders, but not why, given a particular level of control by insiders (in this case, zero), outsiders hold heterogeneous claims, i.e., some are shareholders while others are creditors.

In fact, one's first thought would be that diversity is bad since it creates conflicts of interest between different investors. Moreover, it is not clear why management should be affected by diversity: why does it matter to them that in good states of the world shareholders have control, while in bad states creditors have control (given that management never has control)?

One approach to the diversity issue is based on the existence of collective action problems. Imagine a large company that has many (relatively small) shareholders. Then each shareholder faces the following well-known free-rider problem: if the shareholder does something to improve the quality of management, then the benefits will be enjoyed by all shareholders. Unless the shareholder is altruistic, she will ignore this beneficial impact on other shareholders and so will under-invest in the activity of monitoring or improving management. For example, an individual shareholder will not devote time and resources to persuading other shareholders to vote to replace an incompetent board of directors. As a result, the management of a company with many shareholders will be under little pressure to perform well. (The threat of a hostile takeover bid can overcome the shareholder passivity problem to some extent, but, for all sorts of reasons, is unlikely to eliminate it.)

In contrast, individual creditors can in principle obtain the full benefits of their actions for

themselves and thus do not face the same kind of free-rider problem (at least outside bankruptcy). Suppose a creditor's debt is not repaid. Then she can seize some of the firm's assets if her debt is secured; while if her debt is unsecured she can obtain a judgment against the firm and have a sheriff sell off some of the firm's assets. She does not require other creditors to act. In fact, it is better for her if they do not, since there are then more assets to seize!

So creditors impose discipline on management in a way that shareholders do not. Specifically, whereas a manager who faces a large number of small shareholders is unlikely to be penalized significantly if he fails to deliver high profit or pay out large dividends, a manager who faces a large number of small creditors knows that he must repay his debts or he will be in trouble: his assets will be seized or he will be forced into bankruptcy (which is assumed to be unpleasant for him). However, there is a trade-off: too much discipline can be bad. While some debt is good in order to force management to reduce slack, too much debt is bad because it can lead to the bankruptcy and liquidation of good companies, and can prevent management from financing profitable new projects. Various papers have explored this trade-off and have used it to derive the optimal debt-equity ratio for a company.[19]

The view that financial diversity occurs because of collective action problems is not entirely satisfactory for two reasons. First, the existence of these collective action problems is assumed, not derived: in particular, it is supposed that shareholders face these problems while creditors don't. However, things don't have to be this way. One could imagine a company that sets itself up so that each shareholder has the right to liquidate a fraction of the company's assets

[19]Representative contributions are Grossman and Hart (1982), Jensen (1986), Myers (1977), Rene Stulz (1990), and Hart and Moore (1995).

unilaterally–in fact we see just such an arrangement with open-end mutual funds. Equally, one could imagine that creditors are required to act by a majority vote to seize assets or push a firm into bankruptcy. If most companies choose not to operate this way, we need to explain this; we shouldn't just take it as given.

Second, most collective action models of the trade-off between debt and equity assume that shareholders are completely passive. However, this view is hard to square with the fact that companies routinely pay out cash to shareholders in the form of dividends and share repurchases. If managers face no pressure from shareholders, one would expect them to retain all their earnings: wouldn't they always be able to find something better to do with a dollar than to pay it out to shareholders?

There is a third problem with most collective action models of debt that is also worth mentioning. In these models it is typically the case that debt matters only if a firm is close to bankruptcy. The reason is that, if not, then the firm can pay off its current debts by borrowing against future income, i.e., current debt levels do not constrain management. However, the idea that debt matters only if a firm is in extreme financial distress does not seem very plausible.

In recent years, Erik Berglof and Ernst-Ludwig von Thadden (1994) and Mathias Dewatripont and Jean Tirole (1994) have explored an alternative approach to diversity that proceeds more from first principles. The basic idea behind these papers is that diversity is good not because of the existence of collective action problems, but rather because diversity changes incentives. In particular, suppose that a company has a single investor (or group of homogeneous investors)–say, a shareholder with 100% control rights. This shareholder has the right and the ability to intervene at any time; but assume, in contrast to what has gone before, that intervention

is costly. Then this investor may choose not to act because the costs of intervention exceed the benefits. In contrast, if the company has several investors with heterogeneous claims, it is likely that for at least one investor the benefits of intervention exceed the costs. If this investor also has the ability to intervene, management will be under pressure. The conclusion is that heterogeneous claimants can put more pressure on management than homogeneous claimants when intervention is costly.

It will be useful to present a very simple model–in the form of a numerical example–that illustrates this approach. The model is based on (preliminary) joint work with Moore and draws on the ideas of Jeffrey Zwiebel (1996), as well as those of Berglof and von Thadden (1994) and Dewatripont and Tirole (1994).

Let me begin with a verbal description of the model. Consider a firm that has some current earnings, and is also expected to be profitable in the future. The manager or board of directors of the firm will have to decide how much of the current earnings to pay out to investors. It is plausible that the manager has his own (selfish) reasons for not paying out as much as the shareholders would like, e.g., he might want to engage in empire-building activities or protect against a possible future calamity by buttressing the firm's financial position. (The model below focuses on protection against future calamities rather than empire-building.)[20]

Suppose initially that the firm has no debt, i.e., all investors are shareholders. Assume also

[20]Retaining some cash to protect against future calamities may be at least partly in the interest of shareholders, of course. However, to the extent that the manager obtains a private benefit from continuation, he may retain excessive cash. The model focuses on this excessive element of cash retention. Excessive cash retention was a prominent feature of Kirk Kerkorian's battle against the Chrysler board in the 1990s; for another example, see the discussion of Japanese companies in the Financial Times of October 17, 2000 ("Takeover specialist tries a different tactic," page 10).

that these shareholders have control rights, do not face collective action problems, and so could intervene to force the manager to disgorge some of the "free cash flow." However, intervention is costly, e.g., it requires the expenditure of time or resources. Then the manager will pay out just enough cash–d, say–to stop the shareholders from intervening, i.e., such that the intervention cost equals the inefficiency generated by reinvesting earnings rather than paying them out.

Now assume instead that the firm owes some money to short-term creditors that exceeds d–call the amount p. Suppose that creditors do not have any powers that shareholders do not, i.e., their cost of intervention is just the same. The manager could announce that he will pay the creditors less than what he owes them–say d. However, creditors are unlikely to accept this–they will choose to intervene. Why? The reason is that, if they agree to accept d rather than p, then the residual amount p-d will at best be postponed and possibly even canceled (this is the nature of a debt claim). In either case, if we allow for discounting and uncertainty, creditors won't get much of the residual. In contrast, if they intervene now, they may be able to get all of their p (assuming that the firm's cash flow plus asset value exceeds p). To this end, they will even be prepared to destroy value, e.g., liquidate productive assets or cut-off funds for good investment projects. The point is that creditors do not care about the firm's future profitability given that the beneficiaries of future profitability are shareholders rather than them.

To put it very simply, shareholders are soft because they are the residual income claimants while creditors are tough because they are not.

Now to the details of the model (or example). The model is a slightly more complicated version of the Aghion-Bolton model of Section II, with the one important difference being that intervention is costly. There are four dates. At date 0 the firm is set up at cost C. This amount

must be raised from outside investors since the manager has no funds of his own. At date 1 earnings of y_1 are realized. The firm's manager (or board of directors) then has a choice about how much of y_1 to pay out and how much to retain (retentions are placed in the firm's bank account(s), which pay the going rate of interest). At this stage a controlling outside investor can intervene to undo the manager's pay-out decision–but this costs F. (F can be interpreted as the cost of learning where the firm's bank accounts are.) We suppose that the manager's motive for retaining funds is that the firm will be hit by a liquidity shock at date 2. What this means is that, because of some calamity (environmental, legal . . .), the firm will have to come up with $\$\tilde{k}$ to survive. Here $\tilde{k}$ is a random variable with a known distribution as of date 0; the realization of k becomes known (to the manager and investors) at date 2. Finally, if it survives the liquidity shock, the firm earns y_2 at date 3, which is paid out to investors.

For simplicity, we will assume C = 56, y_1 = 50, $\tilde{k}$ is uniformly distributed on [0,200], y_2 = 90, and the intervention cost F = 18. Also, investors are risk neutral, and the market interest rate is zero.

The time-line is illustrated in Figure 1.

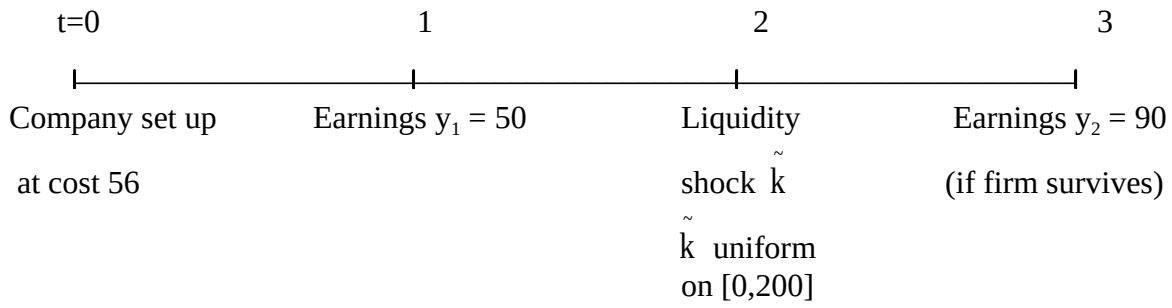

Figure 1

To simplify matters, we suppose that the manager's only interest is to maximize his chances of surviving to date 3, i.e., of overcoming the liquidity shock. (In others words, he gets a fixed private benefit from running the firm between dates 2 and 3 and he maximizes the expected value of this benefit; he's uninterested in cash.) Given that the manager is uninterested in cash, it will never be efficient for him to hold any income claims, i.e., all equity (in the sense of residual income rights) will be held by outside investors.

Denote by e_1 the amount the manager pays out to investors at date 1 and by $i = y_1 - e_1$ the amount he retains. It's useful to start with two polar cases.

Investor Optimum

From the point of view of investors (who hold all the income claims), the firm should survive at date 2 if and only if $k < 90$. The reason is that this is the rule that maximizes present value at date 2: the firm is worth saving only if it costs less to save than it is worth (90).

Moving backwards in time, we see that this outcome can be achieved as long as the firm pays out all its earnings at date 1. The point is that, at date 2, the manager can borrow up to 90 against date 3 earnings; and this will ensure that he can survive liquidity shock k if and only if $k < 90$.

In other words, from the point of view of investors, it is best to leave no slack in the firm at date 2. Under these conditions, the firm's (present) value at date 0 is given by

$$V_{IO} = 50 + 1/200 \int_0^{90} (90 - k)\, dk$$

$$= 70.25.$$

(IO stands for investor optimum.) The first term represents the date 1 earnings that are paid out, while the second term represents the expected going concern value from date 1 onwards: note that the firm borrows k at date 2 whenever $k < 90$, and pays $90 - k$ out as a dividend to investors at date 3.

Observe that $V_{IO} > 56$, so that, if the manager can commit to the investor optimum, the firm will be set up at date 0 (there is enough value to compensate the investors).

Manager Optimum

Once the firm has been set up, the manager has a quite different goal from that of the investors: he wants the firm to survive to date 3. This means that he wants to retain as much earnings at date 1 as possible. Suppose he retains i. Then he can add this to the 90 he can borrow against date 3 earnings and survive any liquidity shock k such that $k < i + 90$. Obviously the manager wants i to be as big as possible, i.e., $i = 50$. That is, if the manager is unconstrained (e.g., he has full control), he'll never pay out anything at date 1.

Given a zero pay-out, the firm will survive if and only if $k < 140$ and, in this case, investors will receive $140 - k$ as a dividend. Thus the firm's (present) value at date 0 will be

$$V_{MO} = 1/200 \int_0^{140} (140 - k)\, dk$$

$$= 49.^{21}$$

(MO stands for manager optimum.)

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[21]We are making an implicit assumption here. If $k > 140$, the manager cannot save the firm and a question arises as to what happens to the date 1 earnings of 50. We take the view that the manager engages in a partial rescue, specifically, he keeps the firm going for a fraction λ of the period between dates 2 and 3, where $90\lambda + 50 = k\lambda$. That is, there are constant returns to scale with respect to time for $\lambda \leq 1$, so that the cash injection required to overcome the liquidity shock is proportional to the length of the period ($\lambda > 1$ is assumed to be infeasible). Given this assumption, the date 1 earnings are totally dissipated, which is why they don't appear in the formula for V_{MO}.

Note that $V_{MO} < 56$, i.e., the manager optimum is not feasible: if the manager has total control of the firm and investors (rationally) expect the manager to retain all the date 1 earnings, they will not finance the firm in the first place.

Shareholder Control

Obviously the manager wants to find a way to persuade investors to finance the firm. In order to do this, he must cede some control to outside investors. One possibility is to allocate all the control rights to a single shareholder (or a group of homogeneous shareholders), so that this shareholder can intervene at date 1. In fact, in the Aghion-Bolton model of Section II, this was the way to put maximum pressure on the insider (the entrepreneur) and to maximize the return to outsiders. However, in that model we ignored any costs of intervening.

In the present context, there is an intervention cost of 18. Suppose there is a single shareholder with all the control rights. At date 1, the manager pays out an amount e_1. At that stage, the shareholder decides whether to intervene. Intervention means that she can choose to pay out more funds if she likes (obviously she'll choose to pay out everything), but she has to incur the intervention cost 18.

The manager will pay out just enough to make the shareholder indifferent between intervention and not. It is easy to see that the equilibrium value of e_1 is 10, i.e., $i = 40$. Given this the firm will be saved at date 2 if and only if $k < 130$ and its (present) value at date 0 will be

$$V_S = 10 + 1/200 \int_0^{130} (130 - k)\, dk = 52.25.$$

Note that $V_{IO} - V_S = 18$, which is the intervention cost. In other words, it is indeed the case that, with $e_1 = 10$, the shareholder is just indifferent between intervening and not.

Unfortunately, $V_S < 56$. In other words, total shareholder control is not enough to get the firm financed at date 0!

Shareholder and Creditor Control

There is a way to get the project financed: it is to include a short-term creditor as well as a controlling shareholder.

Suppose there is a creditor who is owed 20 at date 1. If the creditor is not fully paid, she can choose to intervene at a cost of 18 (just like the shareholder). Assume that, if the creditor intervenes, she can seize retained earnings and pay herself the remaining amount she is owed and be reimbursed for her intervention costs, i.e., if she is owed x, she can seize x + 18.

Finally, suppose that, if the creditor decides not to intervene, her remaining debts are canceled, i.e., she is entitled to nothing further at date 3.

Some of these assumptions are strong, but for our purposes this does not really matter. The debt claim can always be structured with the above features and we are simply trying to show that there is a way to get the firm financed at date 0.

Note also that the assumption that the creditor can be reimbursed does not introduce an

asymmetry between the creditor and the shareholder: the shareholder is also in effect reimbursed for intervening since, as the residual income claimant, she owns everything. To put it another way, if the shareholder reimbursed herself formally, then she would simply be transferring funds from one pocket to another.

The timing is now as follows. First, the manager makes a payment to the creditor–call the amount p. Second, the creditor decides whether or not to intervene. Third, the manager makes a payment to the shareholder–call the amount d. Fourth, the shareholder decides whether to intervene.

I claim that the equilibrium is for the manager to pay 20 to the creditor and nothing to the shareholder and for neither party to intervene. The reason is the following. If the manager pays $p < 20$ to the creditor, the creditor will choose to intervene since she is entitled to collect $20 - p + 18$ (what she is owed plus her reimbursement for intervention) and the firm has $50 - p$ in retained earnings. Since the manager loses 38 in funds altogether if the creditor intervenes, it is better for the manager to pay the creditor the 20 she is owed.

Given that 20 is paid out to the creditor, and 30 is retained, there is no need to pay the shareholder anything. The reason is that the firm is now saved if and only if $k < 120$ and so is worth

$$1/200 \int_0^{120} (120 - k)\, dk = 36$$

at date 1. If the shareholder intervenes, she can increase the firm's value to

$$30 + 1/200 \int_0^{90} (90 - k)\, dk = 50.25$$

by seizing the remaining 30 in retained earnings. But the gain from intervention equals 14.25, which is less than the intervention cost 18, i.e., shareholder intervention will not occur.

So, under short-term debt and equity, the firm will be worth

$$V_{SC} = 20 + 1/200 \int_0^{120} (120 - k)\, dk = 56$$

at date 0, where the first-term represents debt repayment and the second term represents the value of date 3 dividends. Since V_{SC} equals the date 0 investment cost C, it follows that the firm can now be financed!

Some comments on the model are in order. First, it is worth rehearsing the intuition for the benefits of diversity. A single shareholder with full control rights is not tough enough on management. The reason is that intervention is costly and, although intervening permits the

seizure of retained earnings that would otherwise be used for unproductive purposes (from the point of view of the shareholder), the gross rate of return on these earnings is positive (in low k states they will be paid out as a dividend at date 3). So the gains from seizing the retained earnings are not that high. In contrast, a short-term creditor has a very different objective function: any funds left in the firm accrue to the shareholder, not to her (i.e., their gross rate of return is zero), and so her incentive to intervene is much greater.

Note that it is the combination of cash flow rights and control rights that is vital here: it is important both that the creditor has a claim that is capped above (which makes her in effect impatient), and that she has the right to intervene in default states.

A second comment concerns renegotiation. One argument that can be leveled against the beneficial role we have found for short-term debt and equity is that we have ignored the possibility of renegotiation between the shareholder and the creditor. Suppose the manager does not repay the creditor the full 20 she is owed,; e.g., instead the manager pays only 10. It is easy to see that it is not in the collective interest of the shareholder and the creditor for the creditor to intervene since the slack in the system (given by $V_{IO} - V_S$) is only 18, the cost of intervention. In fact, if the creditor intervenes, she is entitled to seize 28 and will gain 10 in net terms, while the shareholder's return will be reduced from

$$1/200 \int_0^{130} (130 - k)\, dk \quad \text{to } 1/200 \int_0^{102} (102 - k)\, dk,$$

i.e., by 16.24. (The shareholder and creditor's incremental payoffs sum to less than zero because the creditor seizes only 28 rather than the 50 she would seize if the shareholder and creditor could coordinate.)

Since the shareholder's loss from intervention exceeds the creditor's gain, one might expect the shareholder to bribe the creditor not to intervene, i.e., pay off her remaining debt. (One way to do this is through a debt-equity swap.) Of course, anticipating this, the manager has no incentive to pay the creditor the full 20 in the first place and the disciplinary role of debt evaporates.

Although this argument has some force, it is far from decisive. What is really involved is a matter of timing. It is true that, if the shareholder has a chance to bribe the creditor after the manager has decided how much to pay the creditor, then this reduces the manager's incentive to pay the creditor. However, it is just as plausible that the shareholder must decide whether to bribe the creditor before the manager makes his decision (i.e., the shareholder's move in the game comes first). In this case the shareholder won't bribe the creditor, knowing that, if she does not, the manager will prefer to pay the creditor the full 20 rather than face intervention.

In other words, under the timing where the shareholder moves first, the model is intact. Note that there is no inefficiency on the equilibrium path: any funds the manager pays out to the creditor reduce slack and so the shareholder is happy to see these funds being paid out.

Third, one might ask whether the manager could avoid the reduction in slack at date 1 by borrowing against future earnings. It is indeed possible for the manager to borrow against future earnings–since the firm is not close to bankruptcy–but this only makes matters worse for him. To raise 20 at date 1 the manager must promise $d > 20$ at date 3 since the firm is not certain to

survive the date 2 liquidity shock. But this means that at date 2 the condition for the firm to survive becomes 140 - d > k, since the manager arrives at date 2 having already mortgaged d. As a result the manager is less likely to survive than if he doesn't borrow, where the condition for survival is 120 > k.

What the manager really wants to do is to issue new equity rather than borrow. If the manager issues new equity of value 20, he can pay his date 1 debt without incurring any future obligations: the condition for date 2 survival becomes k < 140 (given that he has 50 in retained earnings). In fact, the manager can go further. Even if there is no short-term debt, he could issue huge amounts of new equity at date 1–to the point where the value of initial equity is zero–and use the proceeds to provide a large financial cushion at date 2.

Of course, arbitrarily large issues of new equity are not in the interest of the initial shareholder and so it makes sense for the initial contract between the manager and investors to limit these. We have implicitly supposed that no new equity issues are allowed at date 1 (without shareholder permission), but a similar logic will work if a limited number of new shares can be issued, particularly if the time horizon extends to greater than four dates: the manager then faces a trade-off between issuing shares today to create more slack and issuing them in the future when another liquidity shock may hit the firm. Note that a limit on new equity is quite realistic–in practice, companies are usually authorized to issue a certain number of new shares, but once this limit has been reached, the company must get permission from existing shareholders to issue more (in our model, permission will not be given).

A fourth comment concerns the costs and benefits of debt. In the model the benefit of debt is that it is a way for the manager to commit to pay out free cash flow, which enables the

manager to get the firm financed; while the cost of debt is that the manager has less slack to guard against liquidity shocks, which reduces his private benefit. However, in extensions of the model there would be other costs of debt. For example, if the debt level at date 1 exceeded 50, then the manager would have to pay this by borrowing against date 3 earnings. However, this introduces debt overhang at date 2 (in the sense of Myers (1977)): if d is owed at date 3, the condition for the firm to survive the liquidity shock becomes $90 - d > k$, which means that the firm may fail to survive even when survival generates value for investors (survival generates value for investors whenever $90 > k$). If the debt level becomes even higher, the manager may be forced to liquidate part of the firm at date 1, i.e., sell off some key assets, which may again be inefficient.

Finally, if the debt level becomes huge, the firm may declare bankruptcy, and–depending on the bankruptcy procedure–the firm may be turned over to the creditor. However, this creates a problem: the creditor will become the residual income claimant and will act "soft" instead of "tough." So another cost of debt is that, if it becomes too large, the disciplinary role of debt–depending as it does on the existence of multiple claimants with conflicting interests–is lost.

This last observation has two interesting implications. First, it shows that in this model moderate debt levels matter. If the debt level is very small, it does not affect what the manager pays out at date 1 (this is true if $p < 10$); on the other hand, if the debt level is very large, the disciplinary role of debt is lost. As noted earlier, this conclusion contrasts with that of most collective action models of debt in the literature, where debt matters only when a firm is close to bankruptcy. Second, for debt to have a role it is essential that the firm cannot declare bankruptcy too easily. Specifically, a "no-fault" procedure that allows any firm to declare bankruptcy and carry out an automatic debt-equity swap will be counter-productive since the manager can avoid

the disciplinary role of debt. This may provide some justification for the idea that a firm that wants to declare bankruptcy should have to convince a disinterested party, a judge, say, that it cannot pay its debts.

As a last comment, we should note that the above model is consistent with the payment of dividends (or repurchase of shares–we have not distinguished between the two)–something which, as we have pointed out, many models of the debt-equity trade-off are not.[22] This is clearly true if the amount owed at date 1, p, is less than 10, since we saw that the manager will have to pay the shareholder 10 - p to stop her from intervening. At the optimum p =10 and the dividend is zero. However, if we allow for uncertainty in y_1, debt repayments and dividends can both occur at an optimum. Suppose y_1 can be high or low. There is a class of cases such that when y_1 is low p is paid to the creditor and there is no dividend and when y_1 is high p is paid to the creditor and on top of this a dividend is paid to the shareholder.

Whether this theory of dividends is adequate to explain the data is another matter. The theory suggests that the payment of dividends should be quite irregular and the amounts far from constant. There is, of course, a large empirical literature that finds the opposite: dividends are regular and smooth. However, the recent evidence suggests that things are changing. Also, the idea that dividends are the result of pressure from shareholders receives support from a recent cross-country comparison by Rafael La Porta et al. (2000).

IV. Conclusions

Let me conclude briefly. I have discussed how economists' views of firms' financial

[22] Zwiebel (1996) is an exception.

structure decisions have evolved from treating firms' profitability as given, to acknowledging that managerial actions affect profitability, to recognizing that firm value depends on the allocation of decision or control rights. I have tried to show that the decision or control rights approach is useful, even though it is at an early stage of development, and that this approach has some empirical content: it can throw light on the structure of venture capital contracts and the reasons for the diversity of claims.

I have been quite selective in the topics I have covered. For instance, I have not discussed research on why companies in most countries other than the U.S., U.K., and Japan often have controlling shareholders and exhibit deviations from one share-one vote. There has been some very interesting recent empirical and theoretical work on this topic,[23] but a discussion of this will have to wait for another paper.

[23]See the many papers by La Porta et al. (e.g., La Porta et al. (1998)); and Lucian Bebchuk (1999).

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