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Theory of the Firm:

Managerial Behavior, Agency Costs, and Ownership Structure*

> The directors of such [joint-stock] companies, however, being the managers rather of other people's money than of their own, it cannot well be expected, that they should watch over it with the same anxious vigilance with which the partners in a private copartnery frequently watch over their own. Like the stewards of a rich man, they are apt to consider attention to small matters as not for their master's honour, and very easily give themselves a dispensation from having it. Negligence and profusion, therefore, must always prevail, more or less, in the management of the affairs of such a company.
>
> —Adam Smith, *The Wealth of Nations*

1. Introduction and Summary

Motivation of the Paper

In this paper we draw on recent progress in the theory of (1) property rights, (2) agency, and (3) finance to develop a theory of ownership structure for the firm.[1] In addition to tying

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1 We do not use the term *capital structure* because that term usually denotes the relative quantities of bonds, equity, warrants, trade credit, etc., that represent the liabilities of a firm. Our theory implies that there is another important dimension to this problem—namely, the relative amounts of ownership claims held by insiders (management) and outsiders (investors with no direct role in the management of the firm).

K. Brunner (ed.), *Economics Social Institutions*

together elements of the theory of each of these three areas, our analysis casts new light on and has implications for a variety of issues in the professional and popular literature, such as the definition of the firm, the "separation of ownership and control," the "social responsibility" of business, the definition of a "corporate objective function," the determination of an optimal capital structure, the specification of the content of credit agreements, the theory of organizations, and the supply side of the completeness-of-markets problem.

Our theory helps explain:

1. why an entrepreneur or manager in a firm that has a mixed financial structure (containing both debt and outside equity claims) will choose a set of activities for the firm such that the total value of the firm is *less* than it would be if he were the sole owner and why this result is independent of whether the firm operates in monopolistic or competitive product or factor markets;
2. why his failure to maximize the value of the firm is perfectly consistent with efficiency;
3. why the sale of common stock is a viable source of capital even though managers do not literally maximize the value of the firm;
4. why debt was relied upon as a source of capital before debt financing offered any tax advantage relative to equity;
5. why preferred stock would be issued;
6. why accounting reports would be provided voluntarily to creditors and stockholders and why independent auditors would be engaged by management to testify to the accuracy and correctness of such reports;
7. why lenders often place restrictions on the activities of firms to whom they lend and why firms would themselves be led to suggest the imposition of such restrictions;
8. why some industries are characterized by owner-operated firms whose sole outside source of capital is borrowing;
9. why highly regulated industries such as public utilities or banks will have higher debt-equity ratios for equivalent levels of risk than the average nonregulated firm;
10. why security analysis can be socially productive even if it does not increase portfolio returns to investors.

Theory of the Firm: An Empty Box?

While the literature of economics is replete with references to the "theory of the firm," the material generally subsumed under that heading is not a theory of the firm but actually a theory of markets in which firms are important actors. The firm is a "black box" operated so as to meet the relevant marginal conditions with respect to inputs and outputs, thereby maximizing profits or, more accurately, present value. Except for a few recent and tentative steps, however, we have no theory that explains how the conflicting objectives of the individual participants are brought into equilibrium so as to yield this result. The limitations of this black-box view of the firm have been cited by Adam Smith and Alfred Marshall, among others. More recently, popular and professional debates over the "social responsibility" of corporations and the separation of ownership and control and the rash of reviews of the literature on the "theory of the firm" have evidenced continuing concern with these issues.[2]

A number of major attempts have been made during recent years to construct a theory of the firm by substituting other models for profit or value maximization, each attempt motivated by a conviction that the latter is inadequate to explain managerial behavior in large corporations.[3] Some of

2 Reviews of this literature are given by S. Petersen, "Corporate Control and Capitalism," *Quarterly Journal of Economics* 79 (1965): 1–24; A. A. Alchian, "The Basis of Some Recent Advances in the Theory of Management of the Firm," *Journal of Industrial Economics* 14 (1965): 30–44; idem, "Corporate Management and Property Rights," in *Economic Policy and the Regulation of Corporate Securities,* ed. H. Manne (Washington, D.C.: American Enterprise Institute, 1969); F. Machlup, "Theories of the Firm: Marginalist, Behavioral, Managerial," *American Economic Review* 57 (1967): 1–33; M. Shubik, "A Curmudgeon's Guide to Microeconomics," *Journal of Economic Literature* 8 (1970): 405–34; R. M. Cyert and C. L. Hedrick, "Theory of the Firm: Past, Present and Future," ibid., 10 (1972): 398–412; B. Branch, "Corporate Objectives and Market Performance," *Financial Management* (1973): 24–29; L. E. Preston, "Corporation and Society: The Search for a Paradigm," *Journal of Economic Literature* 13 (1975): 434–53.

3 See O. E. Williamson, *The Economics of Discretionary Behavior: Managerial Objectives in a Theory of the Firm* (Englewood Cliffs, N.J.: Prentice-Hall, 1964); idem, *Corporate Control and Business Behavior* (Englewood Cliffs, N.J.: Prentice-Hall, 1970); idem, *Markets and Hierarchies: Analysis and Antitrust Implications* (New York: Free Press, 1975); R. Marris, *The Economic Theory of Managerial Capitalism* (Glencoe, Ill.: Free Press, 1964); W. J. Baumol, *Business Behavior, Value and Growth* (New York: Macmillan, 1959); E. Penrose, *The Theory of the Growth of the Firm* (New York: Wiley, 1958); R. M. Cyert and J. G. March, *A Behavioral Theory of the Firm* (Englewood Cliffs, N.J.: Prentice-Hall, 1963). Thorough reviews of these and other contribu-

these reformulation attempts have rejected the fundamental principle of maximizing behavior as well as the more specific profit-maximizing model. In the analysis to follow, we retain the notion of maximizing behavior on the part of all individuals.[4]

Property Rights

An independent stream of research with important implications for the theory of the firm has been stimulated by the pioneering work of Coase and has been extended by Alchian, Demsetz, and others.[5] While the focus of this research has been "property rights," the subject matter encompassed

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tions are given by F. Machlup, "Theories of the Firm," and Alchian, "Recent Advances."

H. A. Simon, "A Behavioral Model of Rational Choice," *Quarterly Journal of Economics* 69 (1955): 99–118, developed a model of human choice incorporating information (search) and computational costs and also having important implications for the behavior of managers. Unfortunately, Simon's work has often been misinterpreted as a denial of maximizing behavior and has been misused, especially in the marketing and behavioral science literature. His later use of the term *satisficing* has undoubtedly contributed to this confusion because it suggests rejection of maximizing behavior rather than maximization subject to costs of information and of decision making. H. A. Simon, "Theories of Decision Making in Economics and Behavioral Science," *American Economic Review* 49 (1959): 253–83.

4 For the theoretical importance of the assumption of resourceful, evaluative, maximizing behavior on the part of individuals, see W. H. Meckling, "Values and the Choice of the Model of the Individual in the Social Sciences," *Schweizerische Zeitschrift für Volkswirtschaft und Statistik,* 1976, no. 4, pp. 545–59, reprinted in this volume, pp. 00–00. An approach similar to the one embarked on in this paper is taken by W. A. Klein, "Legal and Economic Perspectives on the Firm," unpublished (Los Angeles: University of California, 1976).

5 See R. H. Coase, "The Nature of the Firm," *Economica,* n.s. 4 (1937): 386–405, reprinted in *Readings in Price Theory,* ed. G. J. Stigler and K. Boulding (Homewood, Ill.: Irwin, 1952); idem, "The Federal Communications Commission," *Journal of Law and Economics* 2 (1959): 1–40; idem, "The Problem of Social Costs," ibid., 3 (1960): 1–44; Alchian, "Recent Advances"; idem, "Corporate Management"; A. A. Alchian and R. A. Kessel, "Competition, Monopoly and the Pursuit of Pecuniary Gain," in *Aspects of Labor Economics,* (Princeton, N.J.: Princeton University Press, for the National Bureau of Economic Research, 1962); H. Demsetz, "Toward a Theory of Property Rights," *American Economic Review* 57 (1967): 347–59; A. A. Alchian and H. Demsetz, "Production, Information Costs, and Economic Organization," ibid. 62 (1972): 777–95; R. J. Monsen and A. Downs, "A Theory of Large Managerial Firms," *Journal of Political Economy* 73 (1965): 221–36; M. Silver and R. Auster, "Entrepreneurship, Profit and Limits on Firm Size," *Journal of Business* 42 (1969): 277–81; J. C. McManus, "The Costs of Alternative Economic Organizations," *Canadian Journal of Economics* 8 (1975): 334–50.

A comprehensive survey of this literature is given by E. G. Furubotn and S. Pejovich, "Property Rights and Economic Theory: A Survey of Recent Literature," *Journal of Economic Literature* 10 (1972): 1137–62.

is far broader than that term suggests.[6] What is important for the problems addressed here is that specification of individual rights determines how costs and rewards will be allocated among the participants in any organization. Since the specification of rights is generally effected through contracting (implicit as well as explicit), individual behavior in organizations, including the behavior of managers, will depend upon the nature of these contracts. We focus in this paper on the behavioral implications of the property rights specified in the contracts between the owners and managers of the firm.

Agency Costs

Many problems associated with the inadequacy of the current theory of the firm can also be viewed as special cases of the theory of agency relationships, of which there is a growing literature.[7] This literature has developed independently of the property rights literature even though the problems with which it is concerned are similar; the approaches are in fact highly complementary to each other.

We define an agency relationship as a contract under which one or more persons, the principal(s), engage another person, the agent, to perform some service on their behalf that involves delegating some decision-making authority to the agent. If both parties to the relationship are utility maximizers, there is good reason to believe that the agent will not always act in the best interests of the principal. The *principal* can limit divergences from his interest by establishing appropriate incentives for the agent and by incurring monitoring costs designed to limit the aberrant activities of the agent. In

6 Property rights are, of course, human rights, i.e., rights that are possessed by human beings. The introduction of the wholly false distinction between property rights and human rights in many policy discussions is surely one of the all-time great semantic flimflams.

7 See M. Berhold, "A Theory of Linear Profit-Sharing Incentives," *Quarterly Journal of Economics* 85 (1971): 460–82; S. A. Ross, "The Economic Theory of Agency: The Principals Problems," *American Economic Review* 63 (1973): 134–39; idem, "The Economic Theory of Agency and the Principle of Similarity," in *Essays on Economic Behavior under Uncertainty,* ed. M. D. Balch et al. (Amsterdam: North-Holland, 1974); R. Wilson, "On the Theory of Syndicates," *Econometrica* 36 (1968): 119–32; idem, La decision: Agregation et dynamique des orders de preference (Paris: Editions du Centre National de la Recherche Scientifique, 1969); D. G. Heckerman, "Motivating Managers to Make Investment Decisions," *Journal of Financial Economics* 2 (1975): 273–92.

addition, in some situations it will pay the *agent* to expend resources (bonding costs) to guarantee that he will not take certain actions that would harm the principal or to ensure that the principal will be compensated if he does take such actions. However, it is generally impossible for the principal or the agent at zero cost to ensure that the agent will make optimal decisions from the principal's viewpoint. In most agency relationships the principal and the agent will incur positive monitoring and bonding costs (nonpecuniary as well as pecuniary), and in addition there will be some divergence between the agent's decisions[8] and those decisions that would maximize the welfare of the principal. The dollar equivalent of the reduction in welfare experienced by the principal due to this divergence is also a cost of the agency relationship, and we refer to this latter cost as the residual loss. We define *agency costs* as the sum of:

1. the monitoring expenditures by the principal,[9]
2. the bonding expenditures by the agent, and
3. the residual loss.

Note also that agency costs arise in any situation involving cooperative effort (such as the coauthoring of this paper) by two or more people even though there is no clear-cut principal–agent relationship. Viewed in this light it is clear that our definition of agency costs and their importance to the theory of the firm bears a close relationship to the problem of shirking and monitoring of team production, which Alchian and Demsetz raise in their paper on the theory of the firm.[10]

Since the relationship between the stockholders and manager of a corporation fits the definition of a pure agency relationship, it should be no surprise to discover that the issues associated with the "separation of ownership and control" in the modern diffuse ownership corporation are intimately associated with the general problem of agency. We

8 Given the optimal monitoring and bonding activities by the principal and agent.

9 As it is used in this paper the term *monitoring* includes more than just measuring or observing the behavior of the agent. It includes efforts on the part of the principal to "control" the behavior of the agent through budget restrictions, compensation policies, operating rules, etc.

10 Alchian and Demsetz, "Production."

show below that an explanation of why and how the agency costs generated by the corporate form are borne leads to a theory of the ownership (or capital) structure of the firm.

Before moving on, however, it is worthwhile to point out the generality of the agency problem. The problem of inducing an "agent" to behave as if he were maximizing the "principal's" welfare is quite general. It exists in all organizations and in all cooperative efforts—at every level of management in firms,[11] in universities, in mutual companies, in cooperatives, in governmental authorities and bureaus, in unions, and in relationships normally classified as agency relationships such as are common in the performing arts and the market for real estate. The development of theories to explain the form that agency costs take in each of these situations (where the contractual relations differ significantly), and how and why they are borne, will lead to a rich theory of organizations that is now lacking in economics and the social sciences generally. We confine our attention in this paper to only a small part of this general problem—the analysis of agency costs generated by the contractual arrangements between the owners and top management of the corporation.

Our approach to the agency problem here differs fundamentally from most of the existing literature. That literature focuses almost exclusively on the normative aspects of the agency relationship—that is, how to structure the contractual relation (including compensation incentives) between the principal and agent to provide appropriate incentives for the agent to make choices that will maximize the principal's welfare given uncertainty and imperfect monitoring. We focus almost entirely on the positive aspects of the theory.

11 As we show below, the existence of positive monitoring and bonding costs will result in the manager of a corporation possessing control over some resources that he can allocate (within certain constraints) to satisfy his own preferences. However, to the extent that he must obtain the cooperation of others in order to carry out his tasks (such as divisional vice-presidents) and to the extent that he cannot control their behavior perfectly and costlessly, they will be able to appropriate some of these resources for their own ends. In short, there are agency costs generated at every level of the organization. Unfortunately, the analysis of these more general organizational issues is even more difficult than that of the "ownership and control" issue, because the contractual obligations and rights of the parties are much more varied in nature and generally not as well specified in explicit contractual arrangements. Nevertheless, they exist, and we believe that extensions of our analysis in these directions show promise of producing insights into a viable theory of organization.

That is, we assume individuals solve these normative problems, and given that only stocks and bonds can be issued as claims, we investigate the incentives faced by each of the parties and the elements entering into the determination of the equilibrium contractual form characterizing the relationship between the manager (i.e., agent) of the firm and the outside equity and debt holders (i.e., principals).

Some General Comments on the Definition of the Firm

Ronald Coase, in his seminal paper on the firm, pointed out that economics had no positive theory to determine the bounds of the firm. He characterized the bounds of the firm as that range of exchanges over which the market system was suppressed and resource allocation was accomplished instead by authority and direction. He focused on the cost of using markets to effect contracts and exchanges and argued that activities would be included within the firm whenever the costs of using markets were greater than the costs of using direct authority.[12] Alchian and Demsetz object to the notion that activities within the firm are governed by authority, and they correctly emphasize the role of contracts as a vehicle for voluntary exchange. They emphasize the role of monitoring in situations in which there is joint input or team production.[13] We sympathize with the importance they attach to monitoring, but we believe their emphasis on joint-input production is too narrow and therefore misleading. Contractual relations are the essence of the firm, not only with employees but with suppliers, customers, creditors, etc. The problem of agency costs and monitoring exists for all of these contracts, independent of whether there is joint production in their sense; that is, joint production can explain only a small fraction of the behavior of individuals associated with a firm. A detailed examination of these issues is left to another paper.

It is important to recognize that most organizations are

12 Coase, "Nature of the Firm."

13 Alchian and Demsetz, "Production." They define the classical capitalist firm as a contractual organization of inputs in which there is "(a) joint input production, (b) several input owners, (c) one party who is common to all the contracts of the joint inputs, (d) who has rights to renegotiate any input's contract independently of contracts with other input owners, (e) who holds the residual claim, and (f) who has the right to sell his contractual residual status" (p. 783).

simply *legal fictions that serve as a nexus for a set of contracting relationships among individuals.*[14] This includes firms; nonprofit institutions such as universities, hospitals, and foundations; mutual organizations such as mutual savings banks and insurance companies and cooperatives; some private clubs; and even governmental bodies such as cities, states, and the federal government and government enterprises such as the TVA, the Post Office, and transit systems.

The private corporation or firm is simply one form of *legal fiction that serves as a nexus for contracting relationships and is also characterized by the existence of divisible residual claims on the organization's assets and cash flows, which can generally be sold without permission of the other contracting individuals.* While this definition of the firm has little substantive content, emphasizing the essential contractual nature of firms and other organizations focuses attention on a crucial set of questions—why particular sets of contractual relations arise for various types of organizations, what the consequences of these contractual relations are, and how they are affected by changes exogenous to the organization. Viewed this way, it makes little or no sense to try to distinguish those things that are "inside" the firm (or any other organization) from those things that are "outside" of it. There is in a very real sense only a multitude of complex relationships (i.e., contracts) between the legal fiction (the firm) and the owners of labor, material, and capital inputs and the consumers of output.[15]

Viewing the firm as the nexus of a set of contracting relationships among individuals also serves to make it clear that the personalization of the firm implied by asking questions such as, What should be the objective function of the firm? or, Does the firm have a social responsibility? is seriously misleading. *The firm is not an individual.* It is a legal fiction that serves as a focus for a complex process in which the conflicting objectives of individuals (some of whom may

14 By *legal fiction* we mean the artificial construct under the law that allows certain organizations to be treated as individuals.

15 For example, we ordinarily think of a product as leaving the firm at the time it is sold, but implicitly or explicitly such sales generally carry with them continuing contracts between the firm and the buyer. If the product does not perform as expected, the buyer often has a right to and can obtain satisfaction. Explicit evidence that such implicit contracts do exist is the practice we occasionally observe of specific provision that "all sales are final."

"represent" other organizations) are brought into equilibrium within a framework of contractual relations. In this sense the "behavior" of the firm is like the behavior of a market, that is, the outcome of a complex equilibrium process. We seldom fall into the trap of characterizing the wheat or stock market as an individual, but we often make this error by thinking about organizations as if they were persons with motivations and intentions.[16]

An Overview of the Paper

We develop the theory in stages. Sections 2 and 4 provide analyses of the agency costs of equity and debt, respectively. These form the major foundation of the theory. Section 3 poses some unanswered questions regarding the existence of the corporate form of organization and examines the role of limited liability. In section 5, the basic concepts derived in sections 2–4 are synthesized into a theory of the corporate ownership structure that takes account of the trade-offs available to the entrepreneur–manager between inside and outside equity and debt. Some qualifications and extensions of the analysis are discussed in section 6, and section 7 contains a brief summary and conclusions.

2. The Agency Costs of Outside Equity

Overview

In this section we analyze the effect of outside equity on agency costs by comparing the behavior of a manager when he owns 100 percent of the residual claims on a firm to his

16 This view of the firm points up the important role of the legal system and the law in social organizations, especially the organization of economic activity. Statutory law sets bounds on the kinds of contracts into which individuals and organizations may enter without risking criminal prosecution. The police powers of the state are available and used to enforce performance of contracts or to enforce the collection of damages for nonperformance. The courts adjudicate conflicts between contracting parties and establish precedents that form the body of common law. All of these government activities affect both the kinds of contracts executed and the extent to which contracting is relied upon. This in turn determines the usefulness, productivity, profitability, and viability of various forms of organization. Moreover, new laws as well as court decisions often can and do change the rights of contracting parties ex post, and they can and do serve as a vehicle for redistribution of wealth. An analysis of some of the implications of these facts is contained in M. C. Jensen and W. H. Meckling, "Can the Corporation Survive?" Center for Research in Government Policy and Business Working Paper no. PPS 76-4 (Rochester, N.Y.: University of Rochester, 1976), and we shall not pursue them here.

behavior when he sells off a portion of those claims to outsiders. If a wholly owned firm is managed by the owner, he will make operating decisions that maximize his utility. These decisions will involve not only the benefits he derives from pecuniary returns but also the utility generated by various nonpecuniary aspects of his entrepreneurial activities, such as the physical appointments of the office, the attractiveness of the secretarial staff, the level of employee discipline, the kind and amount of charitable contributions, personal relations ("love," "respect," etc.) with employees, a larger than optimal computer to play with, and purchase of production inputs from friends. The optimum mix (in the absence of taxes) of the various pecuniary and nonpecuniary benefits is achieved when the marginal utility derived from an additional dollar of expenditure (measured net of any productive effects) is equal for each nonpecuniary item and equal to the marginal utility derived from an additional dollar of after-tax purchasing power (wealth).

If the owner–manager sells equity claims on the corporation that are identical to his (i.e., share proportionately in the profits of the firm and have limited liability), agency costs will be generated by the divergence between his interests and those of the outside shareholders, since he will then bear only a fraction of the costs of any nonpecuniary benefits he takes out in maximizing his own utility. If the manager owns only 95 percent of the stock, he will expend resources to the point where the marginal utility derived from a dollar's expenditure of the firm's resources on such items equals the marginal utility of an additional 95 cents in general purchasing power (i.e., *his* share of the wealth reduction) and not one dollar. Such activities on his part can be limited (but probably not eliminated) by the expenditure of resources on monitoring activities by the outside stockholders. But as we show below, the owner will bear the entire wealth effects of these expected costs as long as the equity market anticipates these effects. Prospective minority shareholders will realize that the owner–manager's interests will diverge somewhat from theirs; hence the price they will pay for shares will reflect the monitoring costs and the effect of the divergence between the manager's interest and theirs. Nevertheless, ignoring for the moment the possibility of borrowing against

his wealth, the owner will find it desirable to bear these costs as long as the welfare increment he experiences from converting his claims on the firm into general purchasing power[17] is large enough to offset them.

As the owner–manager's fraction of the equity falls, his fractional claim on the outcomes falls, and this will tend to encourage him to appropriate larger amounts of the corporate resources in the form of perquisites. This also makes it desirable for the minority shareholders to expend more resources in monitoring his behavior. Thus, the wealth costs to the owner of obtaining additional cash in the equity markets rise as his fractional ownership falls.

We shall continue to characterize the agency conflict between the owner–manager and outside shareholders as deriving from the manager's tendency to appropriate perquisites out of the firm's resources for his own consumption. We do not mean to leave the impression, however, that this is the only or even the most important source of conflict. Indeed, it is likely that the most important conflict arises from the fact that as the manager's ownership claim falls, his incentive to devote significant effort to creative activities, such as searching out new profitable ventures, falls. He may in fact avoid such ventures simply because it requires too much trouble or effort on his part to manage or to learn about new technologies. Avoidance of these personal costs and of the anxieties that go with them also represents a source of on-the-job utility to him, and it can result in the value of the firm being substantially lower than it otherwise could be.

A Simple Formal Analysis of the Agency Costs of Equity

In order to develop some structure for the analysis to follow, we make two sets of assumptions. The first set (permanent assumptions) are those carried through almost all of the analysis in sections 2–5. The effects of relaxing some of these are discussed in section 6. The second set (temporary assumptions) are made only for expositional purposes and are relaxed as soon as the basic points have been clarified.

17 For use in consumption, for the diversification of his wealth, or more importantly, for the financing of "profitable" projects that he could not otherwise finance out of his personal wealth. We deal with these issues below after having developed some of the elementary analytical tools necessary to their solution.

Permanent Assumptions:

(P.1) All taxes are zero.
(P.2) No trade credit is available.
(P.3) All outside equity shares are nonvoting.
(P.4) No complex financial claims such as convertible bonds or preferred stock or warrants can be issued.
(P.5) No outside owner gains utility from ownership in a firm in any way other than through its effect on his wealth or cash flows.
(P.6) All dynamic aspects of the multiperiod nature of the problem are ignored by assuming that there is only one production–financing decision to be made by the entrepreneur.
(P.7) The entrepreneur–manager's money wages are held constant throughout the analysis.
(P.8) There exists a single manager (the peak coordinator) with ownership interest in the firm.

Temporary Assumptions:

(T.1) The size of the firm is fixed.
(T.2) No monitoring or bonding activities are possible.
(T.3) No debt financing through bonds, preferred stock, or personal borrowing (secured or unsecured) is possible.
(T.4) All elements of the owner–manager's decision problem involving portfolio considerations induced by the presence of uncertainty and the existence of diversifiable risk are ignored.

Define:

$X = \{x_1, x_2, \ldots, x_n\}$ = vector of quantities of all factors and activities within the firm from which the manager derives nonpecuniary benefits; the x_i are defined such that his marginal utility is positive for each of them;

$C(X)$ = total dollar cost of providing any given amount of these items;

$P(X)$ = total dollar value to the firm of the productive benefits of X;

$B(X) = P(X) - C(X)$ = net dollar benefit to the firm of X, ignoring any effects of X on the equilibrium wage of the manager.

When we ignore the effects of X on the manager's utility and therefore on his equilibrium wage rate, the optimum levels of the factors and activities X are defined by X^* such that

$$\frac{\partial B(X^*)}{\partial X^*} = \frac{\partial P(X^*)}{\partial X^*} - \frac{\partial C(X^*)}{\partial X^*} = 0.$$

Thus, for any vector $X \geqq X^*$ (i.e., where at least one element of X is greater than its corresponding element of X^*), $F \equiv B(X^*) - B(X) > 0$ measures the dollar cost to the firm (net of any productive effects) of providing the increment $X - X^*$ of the factors and activities that generate utility for the manager. We assume henceforth that, for any given level of cost, F, to the firm, the vector of factors and activities on which F is spent are those, $\hat{X}$, which yield the manager maximum utility. Thus $F \equiv B(X^*) - B(\hat{X})$.

We have thus far ignored in our discussion the fact that these expenditures on X occur through time and therefore there are trade-offs to be made across time as well as among alternative elements of X. Furthermore, we have ignored the fact that the future expenditures are likely to involve uncertainty (i.e., they are subject to probability distributions), and therefore some allowance must be made for their riskiness. We resolve both of these issues by defining C, P, B, and F to be the *current market values* of the sequence of probability distributions on the period-by-period cash flows involved.[18]

Given the definition of F as the current market value of the stream of the manager's expenditures on nonpecuniary benefits, we represent the constraint that a single owner–manager faces in deciding how much nonpecuniary income he will extract from the firm by the line $\bar{V}F$ in figure 1. This is analogous to a budget constraint. The market value of the firm is measured along the vertical axis, and the market value of the manager's stream of expenditures on nonpecuniary benefits, F, is measured along the horizontal axis. The value of the firm is $0\bar{V}$ when the amount of nonpecuniary income consumed is zero. By definition V is the maximum

18 And again we assume that, for any given market value of these costs, F, to the firm, the allocation across time and across alternative probability distributions is such that the manager's current expected utility is at a maximum. –

market value of the cash flows generated by the firm for a given money wage for the manager when the manager's consumption of nonpecuniary benefits is zero. At this point all the factors and activities within the firm that generate utility for the manager are at the level X^* defined above. There is a different budget constraint $\overline{VF}$ for each possible scale of the firm (i.e., level of investment, I) and for alternative levels of money wage, W, for the manager. For the moment we pick an arbitrary level of investment (which we assume has already been made) and hold the scale of the firm constant at this level. We also assume that the manager's money wage is fixed at the level W^*, which represents the current market value of his wage contract in the optimal compensation package consisting of both wages, W^*, and nonpecuniary benefits, F^*.[19] Since \$1 of current value of nonpecuniary benefits withdrawn from the firm by the manager reduces the market value of the firm by \$1, by definition, the slope of $\overline{VF}$ is -1.

The owner–manager's tastes for wealth and nonpecuniary benefits is represented in figure 1 by a system of indifference curves, U_1, U_2, etc.[20] The indifference curves will be convex, as drawn, as long as the owner–manager's marginal rate of substitution between nonpecuniary benefits and wealth diminishes with increasing levels of the benefits. For the 100 percent owner–manager, this presumes that perfect substitutes for these benefits are not available on the outside; that

19 At this stage, when we are considering a 100 percent owner-managed firm, the notion of a "wage contract" with himself has no content. However, the 100 percent owner-managed case is only an expositional device used in passing to illustrate a number of points in the analysis, and we ask the reader to bear with us briefly while we lay out the structure for the more interesting partial ownership case, where such a contract does have substance.

20 The manager's utility function is actually defined over wealth and the future time sequence of vectors of quantities of nonpecuniary benefits, X_t. Although the setting of his problem is somewhat different, Fama analyzes the conditions under which these preferences can be represented as a derived utility function defined as a function of the money value of the expenditures (in our notation, F) on these goods, conditional on the prices of goods. E. F. Fama, "Multiperiod Consumption–Investment Decisions," *American Economic Review* 60 (1970): 163–74; idem, "Ordinal and Measurable Utility," in *Studies in the Theory of Capital Markets*, ed. M. C. Jensen (New York: Praeger, 1972). Such a utility function incorporates the optimization going on in the background that defines $\hat{X}$ discussed above for a given F. In the more general case in which we allow a time series of consumption, $\hat{X}_t$, the optimization is being carried out across both time and the components of X_t for fixed F.

is, to some extent they are job specific. For the fractional owner–manager this presumes that the benefits cannot be turned into general purchasing power at a constant price.[21]

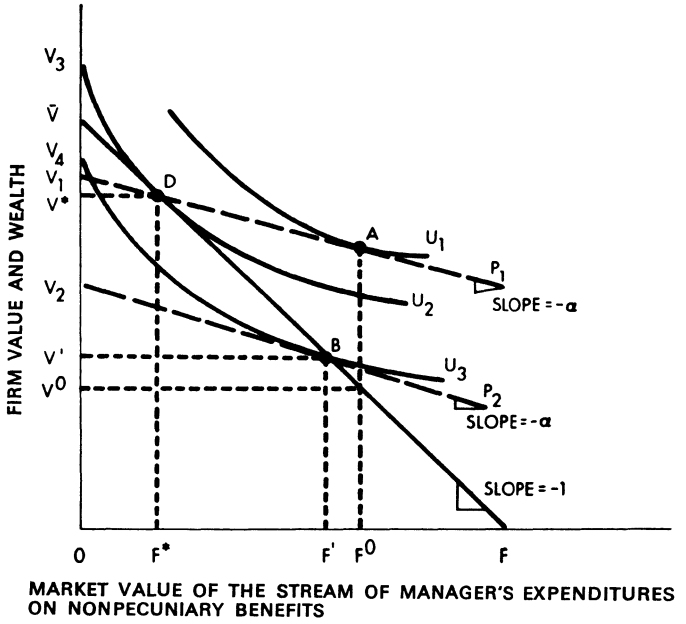

Figure 1. The value of the firm, V, and the level of nonpecuniary benefits consumed, F, when the fraction of outside equity is $(1-\alpha)V$, and $U_j (j = 1, 2, 3)$ represents owner's indifference curves between wealth and nonpecuniary benefits

When the owner has 100 percent of the equity, the value of the firm will be V^*, where indifference curve U_2 is tangent to VF and the level of nonpecuniary benefits consumed is F^*. If the owner sells the entire equity but remains as manager and if the equity buyer can, at zero cost, force the old owner (as manager) to take the same level of nonpecuniary benefits

21 This excludes, for instance, (*a*) the case where the manager is allowed to expend corporate resources on anything he pleases, in which case F would be a perfect substitute for wealth, or (*b*) the case where he can "steal" cash (or other marketable assets) with constant returns to scale—if he could, the indifference curves would be straight lines with slope determined by the fence commission.

as he did as owner, then V^* is the price the new owner will be willing to pay for the entire equity.[22]

In general, however, we would not expect the new owner to be able to enforce identical behavior on the old owner at zero costs. If the old owner sells a fraction of the firm to an outsider, he, as manager, will no longer bear the full cost of any nonpecuniary benefits he consumes. Suppose the owner sells a share of the firm, $1-\alpha$ $(0 < \alpha < 1)$, and retains for himself a share, α. If the prospective buyer believes that the owner–manager will consume the same level of nonpecuniary benefits as he did as full owner, the buyer will be willing to pay $(1-\alpha)V^*$ for a fraction, $1-\alpha$, of the equity. Given that an outsider now holds a claim to $1-\alpha$ of the equity, however, the *cost* to the owner–manager of consuming \$1 of nonpecuniary benefits in the firm will no longer be \$1. Instead, it will be $\alpha \times \$1$. If the prospective buyer actually paid $(1-\alpha)V^*$ for his share of the equity, and if thereafter the manager could choose whatever level of nonpecuniary benefits he liked, his budget constraint would be $\bar{V}_1P_1$ in figure 1, with a slope equal to $-\alpha$. Including the payment the owner receives from the buyer as part of the owner's post-sale wealth, his budget constraint, $\bar{V}_1P_1$, must pass through D, since he can if he wishes have the same wealth and level of nonpecuniary consumption he consumed as full owner.

But if the owner–manager is free to choose the level of perquisites, F, subject only to the loss in wealth he incurs as

22 Point D defines the fringe benefits in the optimal pay package, since the value to the manager of the fringe benefits F^* is greater than the cost of providing them, as is evidenced by the fact that U_2 is steeper to the left of D than the budget constraint with slope equal to -1.

That D is indeed the optimal pay package can easily be seen in this situation, since if the conditions of the sale to a new owner specified that the manager would receive no fringe benefits after the sale, he would require a payment equal to V_3 to compensate him for the sacrifice of his claims to V^* and fringe benefits amounting to F^* (the latter with total value to him of V_3-V^*). But if $F = 0$, the value of the firm is only $\bar{V}$. Therefore, if monitoring costs were zero, the sale would take place at V^* with provision for a pay package that included fringe benefits of F^* for the manager.

This discussion seems to indicate there are two values for the "firm," V_3 and V^*. This is not the case if we realize that V^* is the value of the right to be the residual claimant to the cash flows of the firm, and V_3-V^* is the value of the managerial rights, i.e., the right to make the operating decisions, which include access to F^*. There is at least one other right that has value but plays no formal role in the analysis as yet—the value of the control right. By *control right* we mean the right to hire and fire the manager, and we leave this issue to a future paper.

a part owner, his welfare will be maximized by increasing his consumption of nonpecuniary benefits. He will move to point A, where V_1P_1 is tangent to U_1, representing a higher level of utility. The value of the firm falls from V^* to V^0, that is, by the amount of the cost to the firm of the increased nonpecuniary expenditures, and the owner–manager's consumption of nonpecuniary benefits rises from F^* to F^0.

If the equity market is characterized by rational expectations, the buyers will be aware that the owner will increase his nonpecuniary consumption when his ownership share is reduced. If the owner's response function is known or if the equity market makes unbiased estimates of the owner's response to the changed incentives, the buyer will not pay $(1-\alpha)V^*$ for $1-\alpha$ of the equity.

Theorem. *For a claim on the firm of* $1-\alpha$, *the outsider will pay only* $(1-\alpha)$ *times the value he expects the firm to have, given the induced change in the behavior of the owner–manager.*

Proof

For simplicity we ignore any element of uncertainty introduced by the lack of perfect knowledge of the owner–manager's response function. Such uncertainty will not affect the final solution if the equity market is large as long as the estimates are rational (i.e., unbiased) and the errors are independent across firms. The latter condition assures that this risk is diversifiable, and therefore equilibrium prices will equal the expected values.

Let W represent the owner's total wealth after he has sold a claim equal to $1-\alpha$ of the equity to an outsider. W has two components. One is the payment, S_0, made by the outsider for $1-\alpha$ of the equity; the rest, S_1, is the value of the owner's (i.e., insider's) share of the firm, so that W, the owner's wealth, is given by

$$W = S_0+S_1 = S_0+\alpha V(F, \alpha),$$

where $V(F, \alpha)$ represents the value of the firm given that the manager's fractional ownership share is α and that he consumes perquisites with current market value of F. Let V_2P_2, with a slope of $-\alpha$, represent the trade-off the owner–manager faces between nonpecuniary benefits and his wealth

after the sale. Given that the owner has decided to sell a claim to $1-\alpha$ of the firm, his welfare will be maximized when V_2P_2 is tangent to some indifference curve such as U_3 in figure 1. A price for a claim to $1-\alpha$ of the firm that is satisfactory to both the buyer and the seller will require that this tangency occur along $\bar{V}F$—that is, that the value of the firm be V'. To show this, assume that such is not the case—that the tangency occurs to the left of the point B on the line $\bar{V}F$. Then, since the slope of V_2P_2 is negative, the value of the firm will be larger than V'. The owner–manager's choice of this lower level of consumption of nonpecuniary benefits will imply a higher value both to the firm as a whole and to the fraction of the firm $1-\alpha$ that the outsider has acquired; that is, $(1-\alpha)V' > S_0$. From the owner's viewpoint, he has sold $1-\alpha$ of the firm for less than he could have, given the (assumed) lower level of nonpecuniary benefits he enjoys. On the other hand, if the tangency point B is to the right of the line VF, the owner–manager's higher consumption of nonpecuniary benefits means the value of the firm is less than V', and hence $(1-\alpha)V(F, \alpha) < S_0 = (1-\alpha)V'$. The outside owner then has paid more for his share of the equity than it is worth. S_0 will be a mutually satisfactory price if and only if $(1-\alpha)V' = S_0$. But this means that the owner's postsale wealth is equal to the (reduced) value of the firm V', since

$$W = S_0+\alpha V' = (1-\alpha)V'+\alpha V' = V'.$$

Q.E.D.

The requirement that V' and F' fall on $\bar{V}F$ is thus equivalent to requiring that the value of the claim acquired by the outside buyer be equal to the amount he pays for it, and conversely for the owner. *This means that the decline in the total value of the firm* (V^*-V') *is entirely imposed on the owner–manager.* His total wealth after the sale of $1-\alpha$ of the equity is V', and the decline in his wealth is V^*-V'.

The distance V^*-V' is the reduction in the market value of the firm engendered by the agency relationship and is a measure of the "residual loss" defined earlier. In this simple example the residual loss represents the total agency costs engendered by the sale of outside equity because monitoring and bonding activities have not been allowed. The welfare loss the owner incurs is less than the residual loss by the value

to him of the increase in nonpecuniary benefits ($F'-F^*$). In figure 1 the difference between the intercepts on the Y axis of the two indifference curves U_2 and U_3 is a measure of the owner–manager's welfare loss due to the incurrence of agency costs,[23] and he would sell such a claim only if the increment in welfare he achieves by using the cash amounting to $(1-\alpha)V'$ for other things was worth more to him than this amount of wealth.

Optimal Scale of the Firm with All-Equity Financing

Consider the problem faced by an entrepreneur with initial pecuniary wealth, W, and monopoly access to a project requiring investment outlay, I, subject to diminishing returns to scale in I. Figure 2 portrays the solution to the optimal scale of the firm, taking into account the agency costs associated with the existence of outside equity. The axes are as defined in figure 1 except we now plot on the vertical axis the total wealth of the owner, that is, his initial wealth, W, plus $V(I)-I$, the net increment in wealth he obtains from exploitation of his investment opportunities. The market value of the firm, $V = V(I, F)$, is now a function of the level of investment, I, and the current market value of the manager's expenditures of the firm's resources on nonpecuniary benefits, F. Let $\bar{V}(I)$ represent the value of the firm as a function of the level of investment when the manager's expenditures on nonpecuniary benefits, F, are zero. The schedule in figure 2 with intercept labeled $W+[\bar{V}(I^*)-I^*]$ and slope equal to -1 represents the locus of combinations of postinvestment wealth and dollar cost to the firm of nonpecuniary benefits that are available to the manager when investment is carried to the value-maximizing point, I^*. At this point $\Delta\bar{V}(I)-\Delta I = 0$. If the manager's wealth were large enough to cover the investment required to reach this scale of operation, I^*, he would consume F^* in nonpecuniary benefits and have pecuniary wealth with the value $W+V^*-I^*$. However, if outside financing is required

23 The distance V^*-V' is a measure of what we will call gross agency costs. The distance V_3-V_4 is a measure of what we call net agency costs, and it is this measure of agency costs that will be minimized by the manager in the general case in which we allow investment to change.

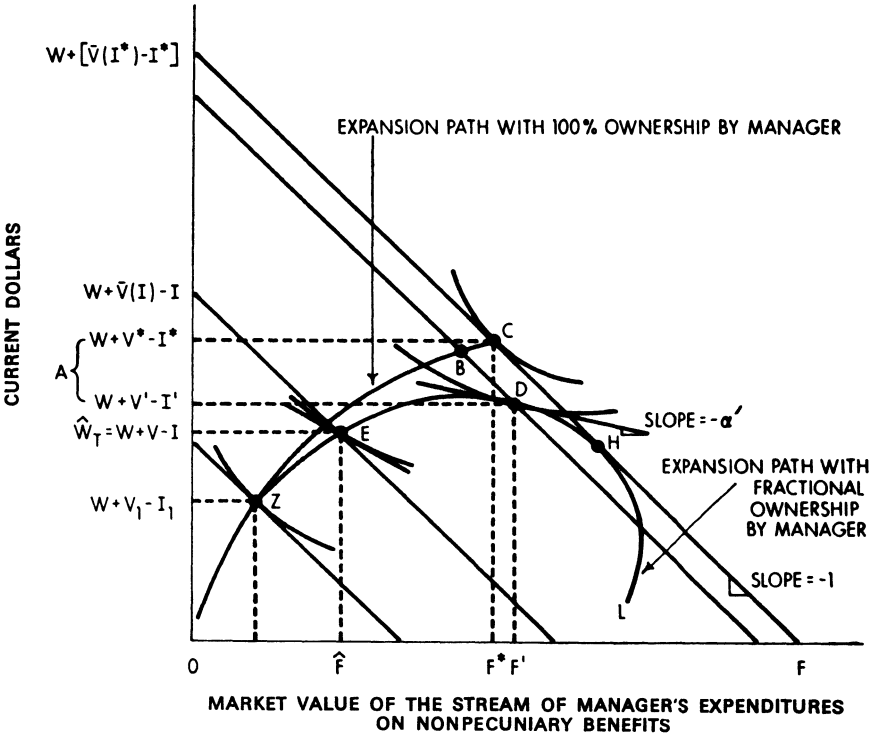

Figure 2. Determination of the optimal scale of the firm in the case where no monitoring takes place. Point C denotes optimum investment, I^*, and nonpecuniary benefits, F^*, when investment is 100 percent financed by the entrepreneur. Point D denotes optimum investment, I', and nonpecuniary benefits, F, when outside equity financing is used to help finance the investment and the entrepreneur owns a fraction, α', of the firm. The distance A measures the gross agency costs.

to cover the investment, he will not reach this point if monitoring costs are nonzero.[24]

24 I^* is the value-maximizing and Pareto-optimum investment level that results from the traditional analysis of the corporate investment decision if the firm operates in perfectly competitive capital and product markets and the agency cost problems discussed here are ignored. See G. Debreu, *Theory of Value* (New York: Wiley, 1959), chap. 7; M. C. Jensen and J. B. Long, "Corporate Investment under Uncertainty and Pareto Optimality in the Capital Markets," *Bell Journal of Economics and Management Science* 3 (1972): 151–74; J. B. Long, "Wealth, Welfare, and the Price

The expansion path *OZBC* represents the equilibrium combinations of wealth and nonpecuniary benefits, *F*, that the manager could obtain if he had enough personal wealth to finance all levels of investment up to I^*. It is the locus of points such as *Z* and *C* that represent the equilibrium position for the 100 percent owner–manager at each possible level of investment, *I*. As *I* increases, we move up the expansion path to the point *C*, where $V(I)-I$ is at a maximum. Additional investment beyond this point reduces the net value of the firm, and as it does, the equilibrium path of the manager's wealth and nonpecuniary benefits retraces (in the reverse direction) the curve *OZBC*. We draw the path as a smooth concave function only as a matter of convenience.

If the manager obtained outside financing and if there were zero costs to the agency relationship (perhaps because monitoring costs were zero), the expansion path would also be represented by *OZBC*. Therefore, this path represents what we might call the "idealized" solutions, that is, those which would occur in the absence of agency costs.

Assume the manager has sufficient personal wealth to completely finance the firm only up to investment level I_1, which puts him at point *Z*. At this point $W = I_1$. To increase the size of the firm beyond this point he must obtain outside financing to cover the additional investment required, and this means reducing his fractional ownership. When he does this he incurs agency costs, and the lower is his ownership fraction, the larger are the agency costs he incurs. However, if the investments requiring outside financing are sufficiently profitable, his welfare will continue to increase.

The expansion path *ZEDHL* in figure 2 portrays one possible path of the equilibrium levels of the owner's nonpecuniary benefits and wealth at each possible level of investment higher than I_1. This path is the locus of points such as *E* or *D* where (1) the manager's indifference curve is tangent to a line with slope equal to $-\alpha$ (his fractional claim on the firm

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of Risk," *Journal of Finance* 27 (1972): 485–88; R. C. Merton and M. G. Subrahmanyam, "The Optimality of a Competitive Stock Market," *Bell Journal of Economics and Management Science* 5 (1974): 145–70; J. Hirschleifer, "On the Theory of Optimal Investment Decisions," *Journal of Political Economy* 66 (1958): 329–52; idem, *Investment, Interest, and Capital* (Englewood Cliffs, N.J.: Prentice-Hall, 1970); E. F. Fama and M. Miller, *The Theory of Finance* (New York: Holt, Rinehart & Winston, 1972).

at that level of investment), and (2) the tangency occurs on the "budget constraint" with slope $= -1$ for the firm value and nonpecuniary benefit trade-off at the same level of investment.[25] As we move along *ZEDHL,* his fractional claim on the firm continues to fall as he raises larger amounts of outside capital. This expansion path represents his complete opportunity set for combinations of wealth and nonpecuniary benefits given the existence of the costs of the agency relationship with the outside equity holders. Point *D,* where this opportunity set is tangent to an indifference curve, represents the solution that maximizes his welfare. At this point, the level of investment is I', his fractional ownership share in the firm is α', his wealth is $W+V'-I'$, and he consumes a stream of nonpecuniary benefits with current market value of F'. The gross agency costs (denoted by A) are equal to $(V^*-I^*)-(V'-I')$. Given that no monitoring is possible, I' is the socially optimal level of investment as well as the privately optimal level.

We can characterize the optimal level of investment as that point, I', which satisfies the following condition for small changes:

$$\Delta V-\Delta I+\alpha'\Delta F = 0. \tag{1}$$

$\Delta V-\Delta I$ is the change in the net market value of the firm, and $\alpha'\Delta F$ is the dollar value to the manager of the incremental

25 Each equilibrium point such as that at E is characterized by $(\hat{a}, \hat{F}, \hat{W}_T)$, where $\hat{W}_T$ is the entrepreneur's postinvestment financing wealth. Such an equilibrium must satisfy each of the following four conditions:

(1) $$\hat{W}_T+F = \overline{V}(I)+W-I = \overline{V}(I)-K,$$

where $K \equiv I-W$ is the amount of outside financing required to make the investment I. If this condition is not satisfied, there is an uncompensated wealth transfer (in one direction or the other) between the entrepreneur and outside equity buyers.

(2) $$U_F(\hat{W}_T, \hat{F})/U_{W_T}(\hat{W}_T, \hat{F}) = \hat{a},$$

where U is the entrepreneur's utility function on wealth and perquisites, U_F and U_{W_T} are marginal utilities, and $\hat{a}$ is the manager's share of the firm.

(3) $$(1-\hat{a})V(I) = (1-\hat{a})[V(I)-\hat{F}] \geqq K,$$

which says the funds received from outsiders are at least equal to K, the minimum required outside financing.

(4) Among all points $(\hat{a}, \hat{F}, \hat{W}_T)$ satisfying conditions (1)–(3), $(\alpha, F, \hat{W}_T)$ gives the manager highest utility. This implies that $(\hat{a}, \hat{F}, \hat{W}_T)$ satisfy condition (3) as an equality.

fringe benefits he consumes (which cost the firm ΔF dollars).[26] Furthermore, recognizing that $V = \bar{V} - F$, where $\bar{V}$ is the value of the firm at any level of investment when $F = 0$, we can substitute into the optimum condition to get

$$(\Delta\bar{V} - \Delta I) - (1 - \alpha')\Delta F = 0 \tag{3}$$

as an alternative expression for determining the optimum level of investment.

The idealized or zero agency cost solution, I^*, is given by the condition $\Delta\bar{V} - \Delta I = 0$; and since ΔF is positive, the actual welfare-maximizing level of investment I' will be less than I^*, because $\Delta\bar{V} - \Delta I$ must be positive at I' if (3) is to be satisfied. Since $-\alpha'$ is the slope of the indifference curve at the optimum and therefore represents the manager's demand price for incremental nonpecuniary benefits, ΔF, we know that $\alpha'\Delta F$ is the dollar value to him of an increment of fringe benefits costing the firm ΔF dollars. The term $(1 - \alpha')\Delta F$ thus measures the dollar "loss" to the firm (and himself) of an additional ΔF dollars spent on nonpecuniary benefits. The term $\Delta\bar{V} - \Delta I$ is the gross increment in the value of the firm, ignoring any changes in the consumption of nonpecuniary benefits. Thus, the manager stops increasing the size of the firm when the gross increment in value is just offset by the incremental "loss" involved in the consumption of additional fringe benefits due to his declining fractional interest in the firm.[27]

26 *Proof.* Note that the slope of the expansion path (or locus of equilibrium points) at any point is $(\Delta V - \Delta I)/\Delta F$, and at the optimum level of investment this must be equal to the slope of the manager's indifference curve between wealth and the market value of fringe benefits, F. Furthermore, in the absence of monitoring, the slope of the indifference curve, $\Delta W/\Delta F$, at the equilibrium point, D, must be equal to $-\alpha'$. Thus,

$$(\Delta V - \Delta I)/\Delta F = -\alpha' \tag{2}$$

is the condition for the optimal scale of investment, and this implies that condition (1) holds for small changes at the optimum level of investment, I'.

27 Since the manager's indifference curves are negatively sloped, we know that the optimum scale of the firm, point D, will occur in the region where the expansion path has negative slope; i.e., the market value of the firm will be declining and the *gross* agency costs, A, will be increasing, and thus the manager will not minimize them in making the investment decision (even though he will minimize them for any *given* level of investment). However, we define the *net* agency cost as the dollar equivalent of the welfare loss the manager experiences because of the agency rela-

The Role of Monitoring and Bonding Activities in Reducing Agency Costs

In the above analysis we have ignored the potential for controlling the behavior of the owner–manager through monitoring and other control activities. In practice, it is usually possible by expending resources to alter the opportunity the owner–manager has for capturing nonpecuniary benefits. These methods include auditing, formal control systems, budget restrictions, and the establishment of incentive compensation systems that serve to identify the manager's interests more closely with those of the outside equity holders, etc. Figure 3 portrays the effects of monitoring and other control activities in the simple situation portrayed in figure 1. The two figures are identical except for the curve BCE in figure 3, which depicts a "budget constraint" derived when monitoring possibilities are taken into account. Without monitoring, and with outside equity of $1-\alpha$, the value of the firm will be V' and nonpecuniary expenditures F'. By incurring monitoring costs, M, the equity holders can restrict the manager's consumption of perquisites to amounts less than F'. Let $F(M, \alpha)$ denote the maximum perquisites the manager can consume for alternative levels of monitoring expenditures, M, given his ownership share α. We assume that increases in monitoring reduce F, and reduce it at a decreasing rate; that is, $\partial F/\partial M < 0$ and $\partial^2 F/\partial M^2 > 0$.

Since the current value of expected future monitoring expenditures by the outside equity holders reduces the value to them, dollar for dollar, of any given claim on the firm, the outside equity holders will take this into account in determin-

tionship evaluated at $F = 0$ (the vertical distance between the intercepts on the Y axis of the two indifference curves on which points C and D lie). The optimum solution, I', does satisfy the condition that net agency costs are minimized. But this simply amounts to a restatement of the assumption that the manager maximizes his welfare.

Finally, it is possible for the solution point D to be a corner solution, and in this case the value of the firm will not be declining. Such a corner solution can occur, for instance, if the manager's marginal rate of substitution between F and wealth falls to zero fast enough as we move up the expansion path or if the investment projects are "sufficiently" profitable. In these cases the expansion path will have a corner that lies on the maximum-value budget constraint with intercept $V(I^*)-I^*$, and the level of investment will be equal to the idealized optimum, I^*. However, the market value of the residual claims will be less than V^* because the manager's consumption of perquisites will be larger than F^*, the zero agency cost level.

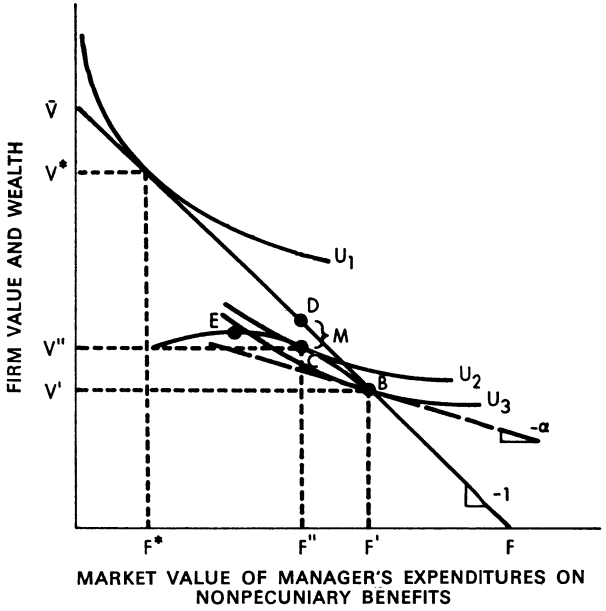

Figure 3. The value of the firm, V, and level of nonpecuniary benefits, F, when outside equity is $1-\alpha$; U_1, U_2, U_3 represent owner's indifference curves between wealth and nonpecuniary benefits; and monitoring (or bonding) activities impose opportunity set BCE as the trade-off constraint facing the owner.

ing the maximum price they will pay for any given fraction of the firm's equity. Therefore, given positive monitoring activity, the value of the firm is given by $V = \bar{V} - F(M, \alpha) - M$, and the locus of these points for various levels of M and for a given level of α lie on the line BCE in figure 3. The vertical difference between the $\bar{V}F$ and BCE curves is M, the current market value of the future monitoring expenditures.

If it is possible for the outside equity holders to make these monitoring expenditures and thereby to impose the reductions in the owner–manager's consumption of F, he will voluntarily enter into a contract with the outside equity holders that gives them the rights to restrict his consumption of nonpecuniary items to F''. He finds this desirable because it will cause the value of the firm to rise to V''. Given the contract, the optimal monitoring expenditure on the part of the out-

siders, M, is the amount $D-C$. The entire increase in the value of the firm that accrues will be reflected in the owner's wealth, but his welfare will be increased by less than this because he forgoes some nonpecuniary benefits he previously enjoyed.

If the equity market is competitive and makes unbiased estimates of the effects of the monitoring expenditures on F and V, potential buyers will be indifferent between the following two contracts:

(i) Purchase of a share $1-\alpha$ of the firm at a total price of $(1-\alpha)V'$ and no rights to monitor or control the manager's consumption of perquisites
(ii) Purchase of a share $1-\alpha$ of the firm at a total price of $(1-\alpha)V''$ and the right to expend resources up to an amount equal to $D-C$ that will limit the owner–manager's consumption of perquisites to F''

Given contract (ii) the outside shareholders would find it desirable to monitor to the full rights of their contract because it will pay them to do so. However, if the equity market is competitive, the total benefits (net of the monitoring costs) will be capitalized into the price of the claims. Thus, not surprisingly, the owner–manager reaps all the benefits of the opportunity to write and sell the monitoring contract.[28]

An Analysis of Bonding Expenditures

We can also see from the analysis of figure 3 that it makes no difference who actually makes the monitoring expendi-

28 The careful reader will note that point C will be the equilibrium point only if the contract between the manager and outside equityholders specifies with no ambiguity that they have the right to monitor in order to limit his consumption of perquisites to an amount no less than F''. If there is any ambiguity in this contract regarding these rights, then there arises another source of agency costs that is symmetrical to our original problem. If they could do so, the outside equityholders would monitor to the point where the net value of *their* holdings, $(1-\alpha)V-M$, was maximized, and this would occur when $(\partial V/\partial M)(1-\alpha)-1 = 0$, which would be at some point between points C and E in fig. 3. Point E denotes the point where the value of the firm net of the monitoring costs is at a maximum, i.e., where $\partial V/\partial M-1 = 0$. But the manager would be worse-off than in the zero-monitoring solution if the maximum point for $(1-\alpha)V-M$ were to the left of the intersection between BCE and the indifference curve U_3 passing through point B (which denotes the zero-monitoring level of welfare). Thus, if the manager could not eliminate enough of the ambiguity in the contract to push the equilibrium to the right of the intersection of the curve BCE with indifference curve U_3, he would not engage in any contract that allowed monitoring.

tures—in all cases, the owner bears the full amount of these costs as a wealth reduction. Suppose that the owner–manager could expend resources to guarantee to the outside equity holders that he would limit his activities that cost the firm F. We call these expenditures bonding costs, and they would take such forms as contractual guarantees to have the financial accounts audited by a public accountant, explicit bonding against malfeasance on the part of the manager, and contractual limitations on the manager's decision-making power (which limitations impose costs on the firm because they reduce his ability to take full advantage of some profitable opportunities, as well as limiting his ability to harm the stockholders while making himself better-off).

If the incurrence of the bonding costs were entirely under the control of the manager and if they yielded for him the same opportunity set BCE in figure 3, he would incur them in amount $D-C$. This would limit his consumption of perquisites to F'' from F', and the solution is exactly the same as if the outside equity holders had performed the monitoring. The manager finds it in his interest to incur these costs as long as the net increments in his wealth that they generate (by reducing the agency costs and therefore increasing the value of the firm) are more valuable than the perquisites given up. This optimum occurs at point C in both cases under our assumption that the bonding expenditures yield the same opportunity set as the monitoring expenditures. In general, of course, it will pay the owner–manager to engage in bonding activities and to write contracts that allow monitoring as long as the marginal benefits of each are greater than their marginal cost.

Optimal Scale of the Firm with Monitoring and Bonding Activities

If we allow the outside owners to engage in (costly) monitoring activities to limit the manager's expenditures on nonpecuniary benefits and we allow the manager to engage in bonding activities to guarantee to the outside owners that he will limit his consumption of F, we get an expansion path such as that on which Z and G lie in figure 4. We have assumed in drawing figure 4 that the cost functions involved in monitoring and bonding are such that some positive levels of the activities are desirable—that is, yield benefits greater than their cost. If this is not true, the expansion path gener-

ated by the expenditure of resources on these activities would lie below ZD, and no such activity would take place at any level of investment. Points Z, C, and D and the two expansion paths on which they lie are identical to those portrayed in figure 2. Points Z and C lie on the 100 percent ownership expansion path, and points Z and D lie on the fractional ownership, zero-monitoring and bonding activity expansion path.

The path on which points Z and G lie is the one given by the locus of equilibrium points for alternative levels of investment characterized in figure 3 by the point labeled C, which denotes the optimal level of monitoring and bonding activity and the resulting values of the firm and nonpecuniary benefits to the manager given a fixed level of investment. If any monitoring or bonding is cost effective, the expansion path on which Z and G lie must over some range be above the nonmonitoring expansion path. Furthermore, if it lies anywhere to the right of the indifference curve passing through point D (the zero monitoring–bonding solution), the final solution to the problem will involve positive amounts of monitoring or bonding activities. Based on the discussion above, we know that as long as the contracts between the manager and outsiders are unambiguous regarding the rights of the respective parties, the final solution will be at that point where the new expansion path is just tangent to the highest indifference curve. At this point the optimal levels of monitoring and bonding expenditures are M'' and b''; the manager's postinvestment-financing wealth is given by $W+V''-I''-M''-b''$, and his nonpecuniary benefits are F''. The total gross agency costs, A, are given by $A(M'', b'', \alpha'', I'') = (V^*-I^*)-(V''-I''-M''-b'')$.

Pareto Optimality and Agency Costs in Manager-Operated Firms

In general we expect to observe both bonding and external monitoring activities, and the incentives are such that the levels of these activities will satisfy the conditions of efficiency. They will not, however, result in the firm being run in a manner so as to maximize its value. The difference between V^*, the efficient solution under zero monitoring and bonding costs (and therefore zero agency costs), and V'', the value of the firm given positive monitoring costs, is the total

gross agency costs defined earlier in the introduction. These are the costs of the "separation of ownership and control," which Adam Smith focused on in the passage quoted at the beginning of this paper and which Berle and Means popularized 157 years later.[29] The solutions outlined above to our highly simplified problem imply that agency costs will be positive as long as monitoring costs are positive—which they certainly are.

The reduced value of the firm caused by the manager's consumption of perquisites outlined above is "nonoptimal" or inefficient only in comparison to a world in which we could obtain compliance of the agent to the principal's wishes at zero cost or in comparison to a *hypothetical* world in which the agency costs were lower. But these costs (monitoring and bonding costs and "residual loss") are an unavoidable result of the agency relationship. Furthermore, since they are borne entirely by the decision maker (in this case, the original owner) responsible for creating the relationship, he has the incentives to see that they are minimized (because he captures the benefits from their reduction). In addition, these agency costs will be incurred only if the benefits to the owner–manager from their creation are great enough to outweigh them. In our current example these benefits arise from the availability of profitable investments requiring capital investment in excess of the original owner's personal wealth.

In conclusion, finding that agency costs are nonzero (i.e., that there are costs associated with the separation of ownership and control in the corporation) and concluding therefrom that the agency relationship is nonoptimal, wasteful, or inefficient is equivalent in every sense to comparing a world in which iron ore is a scarce commodity (and therefore costly) to a world in which it is freely available at zero resource cost and concluding that the first world is "nonoptimal"—a perfect example of the fallacy criticized by Coase and what Demsetz characterizes as the "Nirvana" form of analysis.[30]

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29 A. A. Berle, Jr., and G. C. Means, *The Modern Corporation and Private Property* (New York: Macmillan, 1932).

30 R. H. Coase, "Discussion," *American Economic Review* 54 (1964): 194–97; H. Dem-

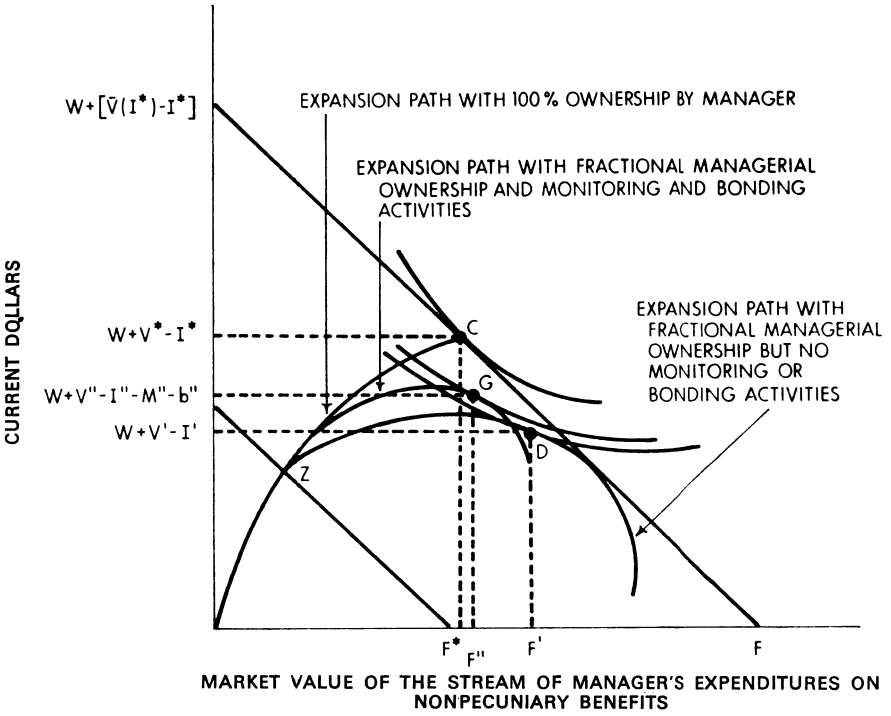

Figure 4. Determination of optimal scale of the firm allowing for monitoring and bonding activities. Optimal monitoring costs are M''; bonding costs are b''; and the equilibrium scale of firm, manager's wealth, and consumption of nonpecuniary benefits are at point G.

Factors Affecting the Size of the Divergence from Ideal Maximization

The magnitude of the agency costs discussed above will vary from firm to firm. It will depend on the tastes of managers, the ease with which they can exercise their own preferences

setz, "Information and Efficiency: Another Viewpoint," *Journal of Law and Economics* 12 (1969): 1–22.

If we could establish the existence of a feasible set of alternative institutional arrangements that would yield net benefits from the reduction of these costs, we could legitimately conclude that the agency relationship engendered by the corporation was not Pareto-optimal. However, we would then be left with the problem of explaining why these alternative institutional arrangements have not replaced the corporate form of organization.

as opposed to value maximization in decision making, and the costs of monitoring and bonding activities.[31] The agency costs will also depend upon the cost of measuring the manager's (agent's) performance and evaluating it, the cost of devising and applying an index for compensating the manager that correlates with the owner's (principal's) welfare, and the cost of devising and enforcing specific behavioral rules or policies. Where the manager has less than a controlling interest in the firm, these costs will also depend upon the market for managers. Competition from other potential managers limits the costs of obtaining managerial services (including the extent to which a given manager can diverge from the idealized solution that would obtain if all monitoring and bonding costs were zero). The size of the divergence (the agency costs) will be directly related to the cost of replacing the manager. If his responsibilities require very little knowledge specialized to the firm, if it is easy to evaluate his performance, and if replacement search costs are modest, the divergence from the ideal will be relatively small, and vice versa.

The divergence will also be constrained by the market for the firm itself, that is, by capital markets. Owners always have the option of selling their firm, either as a unit or piecemeal. Owners of manager-operated firms can and do sample the capital market from time to time. If they discover that the value of the future earnings stream to others is higher than the value of the firm to them given that it is to be manager-operated, they can exercise their right to sell. It is conceivable that other owners could be more efficient at monitoring or even that a single individual with appropriate managerial talents and with sufficiently large personal wealth would elect to buy the firm. In this latter case the purchase by such a single individual would completely eliminate the agency costs. If there were a number of such potential owner–manager purchasers (all with talents and tastes identical to the current manager), the owners would receive in the sale price of the firm the full value of the residual claimant rights,

31 The monitoring and bonding costs will differ from firm to firm depending on such things as the inherent complexity and geographical dispersion of operations, the attractiveness of perquisites available in the firm (consider the mint), etc.

including the capital value of the eliminated agency costs plus the value of the managerial rights.

It is frequently argued that the existence of competition in product (and factor) markets will constrain the behavior of managers to idealized value maximization, that is, that monopoly in product (or monopsony in factor) markets will permit larger divergences from value maximization.[32] Our analysis does not support this hypothesis. The owners of a firm with monopoly power have the same incentives to limit divergences of the manager from value maximization (i.e., the ability to increase their wealth) as do the owners of competitive firms. Furthermore, competition in the market for managers will generally make it unnecessary for the owners to share rents with the manager. The owners of a monopoly firm need only pay the supply price for a manager.

Since the owner of a monopoly has the same wealth incentives to minimize managerial costs as would the owner of a competitive firm, both will undertake that level of monitoring which equates the marginal cost of monitoring to the marginal wealth increment from reduced consumption of perquisites by the manager. Thus, the existence of monopoly will not increase agency costs.

Furthermore, the existence of competition in product and factor markets will not eliminate the agency costs due to managerial control problems, as has often been asserted.[33] If my competitors all incur agency costs equal to or greater than mine, I will not be eliminated from the market by their competition.

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32 See, for example, Williamson, *Discretionary Behavior:*

"Where competitors are numerous and entry is easy, persistent departures from profit maximizing behavior inexorably leads to extinction. Economic natural selection holds the stage. In these circumstances, the behavior of the individual units that constitute the supply side of the product market is essentially routine and uninteresting and economists can confidently predict industry behavior without being explicitly concerned with the behavior of these individual units.

"When the conditions of competition are relaxed, however, the opportunity set of the firm is expanded. In this case, the behavior of the firm as a distinct operating unit is of separate interest. Both for purposes of interpreting particular behavior within the firm as well as for predicting responses of the industry aggregate, it may be necessary to identify the factors that influence the firm's choices within this expanded opportunity set and embed these in a formal model." [P. 2]

33 For example, M. Friedman, "The Social Responsibility of Business Is to Increase Its Profits," *New York Times Magazine,* Sept. 13, 1970, pp. 32 ff.

The existence and size of the agency costs depend on the nature of the monitoring costs, the tastes of managers for nonpecuniary benefits, and the supply of potential managers who are capable of financing the entire venture out of their personal wealth. If monitoring costs are zero, agency costs will be zero; or if there are enough 100 percent owner–managers available to own and run all the firms in an industry (competitive or not), then agency costs in that industry will also be zero.[34]

3. Some Unanswered Questions Regarding the Existence of the Corporate Form

The Question

The analysis up to this point has left us with a basic puzzle: Why, given the existence of positive costs of the agency relationship, do we find so widely prevalent the usual corporate form of organization with widely diffuse ownership? If one takes seriously much of the literature regarding the "discretionary" power held by managers of large corporations, it is difficult to understand the historical fact of enormous growth in equity in such organizations, not only in the United States, but throughout the world. Paraphrasing Alchian: How does it happen that millions of individuals are willing to turn over a significant fraction of their wealth to organizations run by managers who have so little interest in their welfare? What is even more remarkable, Why are they willing to make these commitments purely as residual claimants, that is, on the anticipation that managers will operate the firm so that earnings will accrue to the stockholders?[35]

There is certainly no lack of alternative ways that individuals might invest, including entirely different forms of organizations. Even if consideration is limited to corporate organizations, there are clearly alternative ways capital might be raised—through fixed claims of various sorts, bonds, notes, mortgages, etc. Moreover, the corporate income tax

34 Assuming there are no special tax benefits to ownership nor utility of ownership other than that derived from the direct wealth effects of ownership, such as might be true for professional sports teams, race horse stables, firms that carry the family name, etc.

35 Alchian, "Corporate Management."

seems to favor the use of fixed claims since interest is treated as a tax-deductible expense. Those who assert that managers do not behave in the interest of stockholders have generally not addressed a very important question: Why, if non-manager-owned shares have such a serious deficiency, have they not long since been driven out by fixed claims?[36]

Some Alternative Explanations of the Ownership Structure of the Firm

The Role of Limited Liability

Manne and Alchian and Demsetz argue that one of the attractive features of the corporate form vis-à-vis individual proprietorships or partnerships is the limited liability of equity claims in corporations. Without this provision, each and every investor purchasing one or more shares of a corporation would be potentially liable for the debts of the corporation to the full extent of his personal wealth. Few individuals would find this a desirable risk to accept, and the major benefits to be obtained from risk reduction through diversification would be to a large extent unobtainable.[37] This argument, however, is incomplete, since limited liability does not eliminate the basic risk—it merely shifts it. The argument must rest ultimately on transactions costs. If all stockholders of GM were liable for GM's debts, the maximum liability for an individual shareholder would be greater than if his shares had limited liability. However, given that many other stockholders also existed and that each was liable for the unpaid claims in proportion to his ownership, it is highly unlikely that the maximum payment each would have to make would be large in the event of GM's bankruptcy, since the total wealth of those stockholders would also be large. Nevertheless, the existence of unlimited liability would impose incentives for each shareholder to keep track of both the liabilities of GM and the wealth of the other GM owners. It is easily conceivable that the costs of so doing would, in the aggregate, be much higher than simply paying a premium in

36 Marris, *Managerial Capitalism,* pp. 7–9, is the exception, although he argues that there exists some "maximum leverage point" beyond which the chances of "insolvency" are in some undefined sense too high.

37 H. G. Manne, "Our Two Corporate Systems: Law and Economics," *Virginia Law Review* 53 (1967): 259–84; Alchian and Demsetz, "Production."

the form of higher interest rates to the creditors of GM in return for their acceptance of a contract granting limited liability to the shareholders. The creditors would then bear the risk of any nonpayment of debts in the event of GM's bankruptcy.

It is also not generally recognized that limited liability is merely a necessary condition, not a sufficient condition, for explaining the magnitude of the reliance on equities. Ordinary debt also carries limited liability.[38] If limited liability is all that is required, why don't we observe large corporations, individually owned, with a tiny fraction of the capital supplied by the entrepreneur and the rest simply borrowed?[39] At first this question seems silly to many people (as does the question regarding why firms would ever issue debt or preferred stock under conditions where there are no tax benefits obtained from the treatment of interest or preferred-dividend payments[40]). We have found that oftentimes this question is misinterpreted to be one regarding why firms obtain capital. The issue is not why they obtain capital but why they obtain it through the particular forms we have

38 By *limited liability* we mean the same conditions that apply to common stock. Subordinated debt or preferred stock could be constructed so as to carry with it liability provisions; i.e., if the corporation's assets were insufficient at some point to pay off all prior claims (trade credit, accrued wages, senior debt, etc.) and if the personal resources of the "equityholders" were also insufficient to cover these claims, the holders of this "debt" would be subject to assessments beyond the face value of their claim (assessments that might be limited or unlimited in amount).

39 Alchian and Demsetz, "Production," p. 709, argue that one can explain the existence of both bonds and stock in the ownership structure of firms as the result of differing expectations regarding the outcomes for the firm. They argue that bonds are created and sold to "pessimists" and stocks with a residual claim with no upper bound are sold to "optimists."

As long as capital markets are perfect with no taxes or transactions costs and individual investors can issue claims on distributions of outcomes on the same terms as firms, such actions on the part of firms cannot affect their values. The reason is simple. Suppose such "pessimists" did exist and yet the firm issues only equity claims. The demand for those equity claims would reflect the fact that the individual purchaser could on his own account issue "bonds" with a limited and prior claim to the distribution of outcomes on the equity that is exactly the same as that which the firm could issue. Similarly, investors could easily unlever any position by simply buying a proportional claim to both the bonds and stocks of a levered firm. Therefore, a levered firm could not sell at a different price than an unlevered firm solely because of the existence of such differential expectations. See Fama and Miller, *Theory of Finance,* chap. 4, for an excellent exposition of these issues.

40 Corporations did use both prior to the institution of the corporate income tax in the United States, and preferred dividends have never, with minor exceptions, been tax-deductible.

observed for such long periods of time. The fact is that no well-articulated answer to this question currently exists in the literature of either finance or economics.

The "Irrelevance" of Capital Structure

In their pathbreaking 1958 article on the cost of capital, Modigliani and Miller demonstrated that in the absence of bankruptcy costs and tax subsidies on the payment of interest, the value of the firm is independent of the financial structure. They later demonstrated that the existence of tax subsidies on interest payments would cause the value of the firm to rise with the amount of debt financing by the amount of the capitalized value of the tax subsidy.[41] But this line of argument implies that the firm should be financed almost entirely with debt. Realizing the inconsistency with observed behavior, Modigliani and Miller commented:

> It may be useful to remind readers once again that the existence of a tax advantage for debt financing . . . does not necessarily mean that corporations should at all times seek to use the maximum amount of debt in their capital structures. . . . there are as we pointed out, limitations imposed by lenders . . . as well as many other dimensions (and kinds of costs) in real-world problems of financial strategy which are not fully comprehended within the framework of static equilibrium models, either our own or those of the traditional variety. These additional considerations, which are typically grouped under the rubric of "the need for preserving flexibility," will normally imply the maintenance by the corporation of a substantial reserve of untapped borrowing power.[42]

Modigliani and Miller are essentially left without a theory of the determination of the optimal capital structure, and Fama and Miller, commenting on the same issue, reiterate this conclusion:

> And we must admit that at this point there is little in the way of convincing research, either theoretical or empirical, that explains the amounts of debt that firms do decide to have in their capital structure.[43]

41 F. Modigliani and M. H. Miller, "The Costs of Capital, Corporation Finance, and the Theory of Investment," *American Economic Review* 48 (1958): 261–97; idem, "Corporate Income Taxes and the Cost of Capital," ibid., 53 (1963): 433–43.

42 Modigliani and Miller, "Corporate Income Taxes," p. 442.

43 Fama and Miller, *Theory of Finance,* p. 173.

The Modigliani–Miller theorem is based on the assumption that the probability distribution of the cash flows to the firm is independent of the capital structure. It is now recognized that the existence of positive costs associated with bankruptcy and the presence of tax subsidies on corporate interest payments will invalidate this irrelevance theorem precisely because the probability distribution of future cash flows changes as the probability of the incurrence of the bankruptcy costs changes, that is, as the ratio of debt to equity rises. We believe the existence of agency costs provides stronger reasons for arguing that the probability distribution of future cash flows is *not* independent of the capital, or ownership, structure.

While the introduction of bankruptcy costs in the presence of tax subsidies leads to a theory that defines an optimal capital structure,[44] we argue that this theory is seriously incomplete since it implies that no debt should ever be used in the absence of tax subsidies if bankruptcy costs are positive. Since we know debt was commonly used prior to the existence of the current tax subsidies on interest payments, this theory does not capture what must be some important determinants of the corporate capital structure.

In addition, neither bankruptcy costs nor the existence of tax subsidies can explain the use of preferred stock or warrants that have no tax advantages, and there is no theory that tells us anything about what determines the fraction of equity claims held by insiders as opposed to outsiders, which our analysis in section 2 indicates is so important. We return to these issues later after analyzing in detail the factors affecting the agency costs associated with debt.

4. The Agency Costs of Debt

In general, if the agency costs engendered by the existence of outside owners are positive, it will pay the absentee owner (i.e., shareholders) to sell out to an owner–manager who can avoid these costs.[45] This could be accomplished in principle

44 See A. Kraus and R. Litzenberger, "A State Preference Model of Optimal Financial Leverage," *Journal of Finance* 28 (1973): 911–22; P. Lloyd-Davies, "Risk and Optimal Leverage," unpublished (Rochester, N.Y.: University of Rochester, 1975).

45 And if there is competitive bidding for the firm from potential owner–managers, the absentee owner will capture the capitalized value of these agency costs.

by having the manager become the sole equity holder by repurchasing all of the outside equity claims with funds obtained through the issuance of limited liability debt claims and through the use of his own personal wealth. This single-owner corporation would not suffer the agency costs associated with outside equity. Therefore, there must be some compelling reasons why we find so prevalent as an organizational form the diffuse-owner corporate firm financed by equity claims.

An ingenious entrepreneur, eager to expand, has the opportunity to design a whole hierarchy of fixed claims on assets and earnings, with premiums paid for different levels of risk.[46] Why don't we observe large corporations individually owned, with a tiny fraction of the capital supplied by the entrepreneur in return for 100 percent of the equity and the rest simply borrowed? We believe there are a number of reasons: (1) the incentive effects associated with highly leveraged firms, (2) the monitoring costs these incentive effects engender, and (3) bankruptcy costs. Furthermore, all of these costs are simply particular aspects of the agency costs associated with the existence of debt claims on the firm.

The Incentive Effects Associated with Debt

We don't find many large firms financed almost entirely with debt-like claims (i.e., nonresidual claims) because of the effect such a financial structure would have on the owner–manager's behavior. Potential creditors will not loan $100 million to a firm in which the entrepreneur has an investment of $10,000. With that financial structure the owner–manager will have a strong incentive to engage in activities (investments) that promise very high payoffs if successful even if they have a very low probability of success. If they

46 The spectrum of claims that firms can issue is far more diverse than is suggested by our two-way classification—fixed vs. residual. There are convertible bonds, equipment trust certificates, debentures, revenue bonds, warrants, etc. Different bond issues can contain different subordination provisions with respect to assets and interest. They can be callable or noncallable. Preferred stocks can be "preferred" in a variety of dimensions and contain a variety of subordination stipulations. In the abstract, we can imagine firms issuing claims contingent on a literally infinite variety of states of the world such as those considered in the literature on the time–state preference models. See K. J. Arrow, "The Role of Securities in the Optimal Allocation of Risk Bearing," *Review of Economic Studies* 31 (1964): 91–96; Debreu, *Theory of Value;* Hirschleifer, *Investment, Interest, and Capital.*

turn out well, he captures most of the gains; if they turn out badly, the creditors bear most of the costs.[47]

To illustrate the incentive effects associated with the existence of debt and to provide a framework within which we can discuss the effects of monitoring and bonding costs, wealth transfers, and the incidence of agency costs, we again consider a simple situation. Assume we have a manager-owned firm with no debt outstanding, in a world in which there are no taxes. The firm has the opportunity to take one of two mutually exclusive equal-cost investment opportunities, each of which yields a random payoff, $\tilde{X}_j$, T periods in the future ($j = 1, 2$). Production and monitoring activities take place continuously between time 0 and time T, and markets in which the claims on the firm can be traded are open continuously over this period. After time T the firm has no productive activities, so the payoff $\tilde{X}_j$ includes the distribution of all remaining assets. For simplicity, we assume that the two distributions are log-normally distributed and have the same expected total payoff, $E(\tilde{X})$, where $\tilde{X}$ is defined as the logarithm of the final payoff. The distributions differ only by their variances with $\sigma_1^2 < \sigma_2^2$. The systematic, or covariance, risk of each of the distributions, β_j, in the Sharpe-Lintner capital asset–pricing model is assumed to be identical.[48] Assuming that asset prices are determined according to the capital asset–pricing model, the preceding assumptions imply that the total market value of each of these distributions is identical, and we represent this value by V.

If the owner–manager has the right to decide which investment program to take, and if after he decides this he has the opportunity to sell part or all of his claims on the outcomes in the form of either debt or equity, he will be indifferent between the two investments.[49] However, if the owner

47 An apt analogy is the way one would play poker on money borrowed at a fixed interest rate, with one's own liability limited to some very small stake. Fama and Miller, *Theory of Finance*, pp. 179–80, also discuss and provide a numerical example of an investment decision that illustrates very nicely the potential inconsistency between the interests of bondholders and stockholders.

48 W. F. Sharpe, "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk," *Journal of Finance* 19 (1964): 425–42; J. Lintner, "Security Prices, Risk, and Maximal Gains from Diversification," ibid., 20 (1965): 587–616.

49 The portfolio diversification issues facing the owner–manager are brought into the analysis in sec. 5 below.

has the opportunity to *first* issue debt, then to decide which of the investments to take, and then to sell all or part of his remaining equity claim on the market, he will not be indifferent between the two investments. The reason is that by promising to take the low-variance project, selling bonds, and then taking the high-variance project he can transfer wealth from the (naïve) bondholders to himself as equity holder.

Let X^* be the amount of the "fixed" claim in the form of a non-coupon-bearing bond sold to the bondholders such that the total payoff to them, R_j ($j = 1, 2$, denotes the distribution the manager chooses), is

$$\begin{aligned} R_j &= X^*, \quad \text{if} \quad \tilde{X}_j \geqq X^*, \\ &= X_j, \quad \text{if} \quad \tilde{X}_j \leq X^*. \end{aligned}$$

Let B_1 be the current market value of bondholder claims if investment 1 is taken, and let B_2 be the current market value of bondholder claims if investment 2 is taken. Since in this example the total value of the firm, V, is independent of the investment choice and also of the financing decision, we can use the Black-Scholes option-pricing model to determine the values of the debt, B_j, and equity, S_j, under each of the choices.[50]

Black and Scholes derive the solution for the value of a European call option (one that can be exercised only at the maturity date) and argue that the resulting option-pricing equation can be used to determine the value of the equity claim on a levered firm. That is, the stockholders in such a firm can be viewed as holding a European call option on the total value of the firm with exercise price equal to X^* (the face value of the debt), exercisable at the maturity date of the debt issue. More simply, the stockholders have the right to buy the firm back from the bondholders for a price of X^* at time T. Merton shows that, as the variance of the outcome

50 F. Black and M. Scholes, "The Pricing of Options and Corporate Liabilities," *Journal of Political Economy* 81 (1973): 637–54. See C. Smith, "Option Pricing: A Review," *Journal of Financial Economics* 3 (1976): 3–52, for a review of the option-pricing literature and its applications; and see D. Galai and R. W. Masulis, "The Option Pricing Model and the Risk Factor of Stock," ibid., pp. 53–82, for an application of the model to mergers and corporate investment decisions.

distribution rises, the value of the stock (i.e., call option) rises;[51] since our two distributions differ only in their variances, $\sigma_2^2 < \sigma_1^2$, the equity value S_1 is less than S_2. This implies $B_1 > B_2$, since $B_1 = V - S_1$ and $B_2 = V - S_2$.

Now if the owner–manager could sell bonds with face value X^* under the conditions that the potential bondholders believed this to be a claim on distribution 1, he would receive a price of B_1. After selling the bonds, his equity interest in distribution 1 would have value S_1. But we know S_2 is greater than S_1, and thus the manager can make himself better-off by changing the investment to take the higher-variance distribution 2, thereby redistributing wealth from the bondholders to himself. All this assumes, of course, that the bondholders could not prevent him from changing the investment program. *If the bondholders cannot do so, and if they perceive that the manager has the opportunity to take distribution* 2, *they will pay the manager only* B_2 *for the claim* X^*, *realizing that his maximizing behavior will lead him to choose distribution* 2. In this event there is no redistribution of wealth between bondholders and stockholders (and in general with rational expectations there never will be) and no welfare loss. It is easy to construct a case, however, in which these incentive effects do generate real costs.

Let cash flow distribution 2 in the previous example have an expected value, $E(X_2)$, which is lower than that of distribution 1. Then we know that $V_1 > V_2$, and if ΔV, which is given by

$$\Delta V = V_1 - V_2 = (S_1 - S_2) + (B_1 - B_2),$$

is sufficiently small relative to the reduction in the value of the bonds, the value of the stock will increase.[52] If we re-

51 R. C. Merton, "The Theory of Rational Option Pricing," *Bell Journal of Economics and Management Science* 4 (1973): 141–83; idem, "On the Pricing of Corporate Debt: The Risk Structure of Interest Rates," *Journal of Finance* 29 (1974): 449–70.

52 While we used the option-pricing model above to motivate the discussion and to provide some intuitive understanding of the incentives facing the equityholders, the solutions of Black and Scholes, "Pricing of Options," do not apply when incentive effects cause V to be a function of the debt-equity ratio, as it is in general and in this example. J. B. Long, "Discussion," *Journal of Finance* 27 (1974): 485–88, points out this difficulty with respect to the usefulness of the model in the context of tax subsidies on interest and of bankruptcy cost. The results of Merton, "Pricing of Corporate Debt," and Galai and Masulis, "Option Pricing Model," must be interpreted with care, since the solutions are strictly incorrect in the context of tax subsidies or agency costs.

arrange the expression for ΔV, the difference between the equity values for the two investments is given by

$$S_2 - S_1 = (B_1 - B_2) - (V_1 - V_2),$$

and the term $B_1 - B_2$ is the amount of wealth "transferred" from the bondholders, and $V_1 - V_2$ is the reduction in overall firm value. Since we know $B_1 > B_2$, $S_2 - S_1$ can be positive even though the reduction in the value of the firm, $V_1 - V_2$, is positive.[53] Again, the bondholders will not actually lose as long as they accurately perceive the motivation of the equity-owning manager and his opportunity to take project 2. They will presume he will take investment 2 and hence will pay no more than B_2 for the bonds when they are issued.

In this simple example the reduced value of the firm, $V_1 - V_2$, is the agency cost engendered by the issuance of debt, and it is borne by the owner–manager.[54] If he could finance the project out of his personal wealth, he would clearly choose project 1, since its investment outlay was assumed equal to that of project 2 and its market value, V_1, was

53 The numerical example of Fama and Miller, *Theory of Finance*, pp. 179–80, is a close representation of this case in a two-period state model. However, they go on to make the following statement on p. 180:

"From a practical viewpoint, however, situations of potential conflict between bondholders and shareholders in the application of the market value rule are probably unimportant. In general, investment opportunities that increase a firm's market value by more than their cost both increase the value of the firm's shares and strengthen the firm's future ability to meet its current bond commitments."

This first issue regarding the importance of the conflict of interest between bondholders and stockholders is an empirical one, and the last statement is incomplete—in some circumstances the equityholders could benefit from projects whose net effect was to reduce the total value of the firm—as they and we have illustrated. The issue cannot be brushed aside so easily.

54 Myers points out another serious incentive effect on managerial decisions of the existence of debt that does not occur in our simple single-decision world. He shows that if the firm has the option to take future investment opportunities, the existence of debt that matures after the options must be taken will cause the firm (using an equity-value-maximizing investment rule) to refuse to take some otherwise profitable projects because they would benefit only the bondholders and not the equityholders. This will (in the absence of tax subsidies to debt) cause the value of the firm to fall. Thus (although he doesn't use the term) these incentive effects also contribute to the agency costs of debt in a manner perfectly consistent with the examples discussed in the text. S. C. Myers, "A Note on the Determinants of Corporate Debt Capacity," unpublished (London: London Graduate School of Business Studies, 1975).

greater. This wealth loss, $V_1 - V_2$, is the "residual loss" portion of what we have defined as agency costs, and it is generated by the cooperation required to raise the funds to make the investment. Another important part of the agency costs is monitoring and bonding costs, and we now consider their role.

The Role of Monitoring and Bonding Costs

In principle it would be possible for the bondholders, by the inclusion of various covenants in the indenture provisions, to limit the managerial behavior that results in reductions in the value of the bonds. Provisions imposing constraints on management's decisions regarding such things as dividends, future debt issues, and maintenance of working capital are not uncommon in bond issues.[55] To completely protect the bondholders from the incentive effects, these provisions would have to be incredibly detailed and cover most operating aspects of the enterprise, including limitations on the riskiness of the projects undertaken. The costs involved in writing such provisions, the costs of enforcing them, and the reduced profitability of the firm (induced because the covenants occasionally limit management's ability to take optimal actions on certain issues) would likely be nontrivial. In fact, since management is a continuous decision-making process, it will be almost impossible to completely specify such conditions without having the bondholders actually perform the management function. All costs associated with such covenants are what we mean by monitoring costs.

The bondholders will have incentives to engage in the writing of such covenants and in monitoring the actions of the manager to the point where the "nominal" marginal cost to them of such activities is just equal to the marginal benefits they perceive from engaging in them. We use the word *nominal* here because debtholders will not in fact bear these costs. As long as they recognize their existence, they will take them into account in deciding the price they will pay for any given

55 Black and Scholes, "Pricing of Options," discuss the ways in which dividend and future financing policy can redistribute wealth between classes of claimants on the firm. F. Black, M. H. Miller, and R. A. Posner, "An Approach to the Regulation of Bank Holding Companies," unpublished (Chicago: University of Chicago, 1974), discuss many of these issues with particular reference to their topic.

debt claim,[56] and therefore the seller of the claim (the owner) will bear the costs just as in the equity case discussed in section 2.

In addition, the manager has incentives to take into account the costs imposed on the firm by covenants in the debt agreement that directly affect the future cash flows of the firm, since they reduce the market value of his claims. Because both the external and internal monitoring costs are imposed on the owner–manager, it is in his interest to see that the monitoring is performed in the lowest-cost way. Suppose, for example, that the bondholders (or outside equity holders) would find it worthwhile to produce detailed financial statements such as those contained in the usual published accounting reports as a means of monitoring the manager. If the manager himself can produce such information at lower costs than they (perhaps because for his own internal decision-making purposes he is already collecting much of the data they desire), it would pay him to agree in advance to incur the cost of providing such reports and to have their accuracy testified to by an independent outside auditor. This is an example of what we refer to as bonding costs.[57]

56 In other words, these costs will be taken into account in determining the yield to maturity on the issue. For an examination of the effects of such enforcement costs on the nominal interest rates in the consumer small-loan market, see G. Benston, "The Impact of Maturity Regulation on High Interest Rate Lenders and Borrowers," *Journal of Financial Economics* 4 (1977): 23–49.

57 To illustrate the fact that it will sometimes pay the manager to incur "bonding" costs to guarantee the bondholders that he will not deviate from his promised behavior, let us suppose that for an expenditure of $\$b$ of the firm's resources he can guarantee that project 1 will be chosen. If he spends these resources and takes project 1, the value of the firm will be $V_1 - b$; and clearly, as long as $(V_1 - b) > V_2$ or, alternatively, $(V_1 - V_2) > b$, he will be better-off, since his wealth will be equal to the value of the firm minus the required investment, I (which we assumed for simplicity to be identical for the two projects).

On the other hand, to prove that the owner–manager prefers the lowest-cost solution to the conflict, let us assume he can write a covenant into the bond issue that will allow the bondholders to prevent him from taking project 2 if they incur monitoring costs of $\$m$, where $m < b$. If he does this, his wealth will be higher by the amount $b - m$. To see this, note that if the bond market is competitive and makes unbiased estimates, potential bondholders will be indifferent between:

(i) a claim X^* with no covenant (and no guarantees from management) at a price of B_2,

(ii) a claim X^* with no covenant (and guarantees from management, through bonding expenditures by the firm of $\$b$, that project 1 will be taken) at a price of B_1, and

Bankruptcy and Reorganization Costs

We argue in section 5 that, as the debt in the capital structure increases beyond some point, the marginal agency costs of debt begin to dominate the marginal agency costs of outside equity; the result of this is the generally observed phenomenon of the simultaneous use of both debt and outside equity. Before considering these issues, however, we consider here the third major component of the agency costs of debt, which helps to explain why debt doesn't completely dominate capital structures—the existence of bankruptcy and reorganization costs.

It is important to emphasize that bankruptcy and liquida-

(iii) a claim X^*, with a covenant and the opportunity to spend m on monitoring (to guarantee that project 1 will be taken) at a price of B_1-m.

The bondholders will realize that (i) in fact represents a claim on project 2 and that (ii) and (iii) represent a claim on project 1 and will thus be indifferent between the three options at the specified prices. The owner–manager, however, will not be indifferent between incurring the bonding costs, b, directly, or including the covenant in the bond indenture and letting the bondholders spend m to guarantee that he take project 1. His wealth in the two cases will be given by the value of his equity plus the proceeds of the bond issue less the required investment, and if $m < b < V_1-V_2$, then his post-investment-financing wealth, W, for the three options will be such that $W_i < W_{ii} < W_{iii}$. Therefore, since it would increase his wealth, he would voluntarily include the covenant in the bond issue and let the bondholders monitor.

Without going into the problem in detail, we mention another issue. Similar to the case in which the outside equityholders are allowed to monitor the manager–owner, the agency relationship between the bondholders and stockholders has a symmetry if the rights of the bondholders to limit actions of the manager are not perfectly spelled out. Suppose the bondholders, by spending sufficiently large amounts of resources, could force management to take actions that would transfer wealth from the equityholders to the bondholders (by taking sufficiently less risky projects). One can easily construct situations in which such actions could make the bondholders better-off, hurt the equityholders, and actually lower the total value of the firm. Given the nature of the debt contract, the original owner–manager might maximize his wealth in such a situation by selling off the equity and keeping the bonds as his "owner's" interest. If the nature of the bond contract is given, this may well be an inefficient solution, since the total agency costs (i.e., the sum of monitoring and value loss) could easily be higher than the alternative solution. However, if the owner–manager could strictly limit the rights of the bondholders (perhaps by inclusion of a provision that expressly reserves for the equityholder all rights not specifically granted to the bondholder), he would find it in his interest to establish the efficient contractual arrangement, since by minimizing the agency costs he would be maximizing his wealth. These issues involve the fundamental nature of contracts, and for now we simply assume that the "bondholders' " rights are strictly limited and unambiguous and all rights not specifically granted them are reserved for the "stockholders"—a situation descriptive of actual institutional arrangements. This allows us to avoid the incentive effects associated with "bondholders" potentially exploiting "stockholders."

tion are very different events. The legal definition of bankruptcy is difficult to specify precisely. In general, it occurs when the firm cannot meet a current payment on a debt obligation,[58] or one or more of the other indenture provisions providing for bankruptcy is violated by the firm. In this event the stockholders have lost all claims on the firm,[59] and the remaining loss, the difference between the face value of the fixed claims and the market value of the firm, is borne by the debtholders. Liquidation of the firm's assets will occur only if the market value of the future cash flows generated by the firm is less than the opportunity cost of the assets, that is, the sum of the values that could be realized if the assets were sold piecemeal.

If there were no costs associated with the event called bankruptcy, the total market value of the firm would not be affected by increasing the probability of its incurrence. However, it is costly, if not impossible, to write contracts representing claims on a firm and clearly delineating the rights of holders for all possible contingencies. Thus, even if there were no adverse incentive effects in expanding fixed claims relative to equity in a firm, the use of such fixed claims would be constrained by the costs inherent in defining and enforcing those claims. Firms incur obligations daily to suppliers, to employees, to different classes of investors, etc. So long as the firm is prospering, the adjudication of claims is seldom a problem. When the firm has difficulty meeting some of its obligations, however, the issue of the priority of those claims can pose serious problems. This is most obvious in the extreme case in which the firm is forced into bankruptcy. If bankruptcy were costless, the reorganization would be accompanied by an adjustment of the claims of various parties, and the business could, if that proved to be in the interest of

58 If the firm were allowed to sell assets to meet a current debt obligation, bankruptcy would occur when the total market value of the future cash flows expected to be generated by the firm is less than the value of a current payment on a debt obligation. Many bond indentures do not, however, allow for the sale of assets to meet debt obligations.

59 We have been told that while this is true in principle, the actual behavior of the courts frequently appears to involve the provision of some settlement to the common stockholders even when the assets of the company are not sufficient to cover the claims of the creditors.

the claimants, simply go on (although perhaps under new management).[60]

In practice, bankruptcy is not costless but generally involves an adjudication process that itself consumes a fraction of the remaining value of the assets of the firm. Thus the cost of bankruptcy will be of concern to potential buyers of fixed claims in the firm, since their existence will reduce the payoffs to them in the event of bankruptcy. These are examples of the agency costs of cooperative efforts among individuals (although in this case, perhaps *noncooperative* would be a better term). The price buyers will be willing to pay for fixed claims will thus be inversely related to the probability of the incurrence of these costs—that is, to the probability of bankruptcy. Using a variant of the argument employed above for monitoring costs, it can be shown that the total value of the firm will fall and the owner–manager equityholder will bear the entire wealth effect of the bankruptcy costs as long as potential bondholders make unbiased estimates of their magnitude at the time they initially purchase bonds.[61]

Empirical studies of the magnitude of bankruptcy costs are almost nonexistent. Warner, in a study of 11 railroad bankruptcies between 1930 and 1955, estimates the average costs of bankruptcy as a fraction of the value of the firm three years prior to bankruptcy to be 2.5 percent (with a range of 0.4–5.9 percent). The average dollar costs were $1.88 million.[62] Both of these measures seem remarkably

60 If under bankruptcy the bondholders have the right to fire the management, the management will have some incentives to avoid taking actions that increase the probability of this event (even if it is in the best interest of the equityholders) if they (the management) are earning rents or if they have human capital specialized to this firm or if they face large adjustment costs in finding new employment. A detailed examination of this issue involves the value of the control rights (the rights to hire and fire the manager), and we leave it to a subsequent paper.

61 Kraus and Litzenberger, "Optimal Financial Leverage," and Lloyd-Davies, "Risk and Optimal Leverage," demonstrate that the total value of the firm will be reduced by these costs.

62 J. B. Warner, "Bankruptcy Costs, Absolute Priority, and the Pricing of Risky Debt Claims," unpublished (Chicago: University of Chicago, 1975). Average costs of bankruptcy included only payments to all parties for legal fees, professional services, trustees' fees, and filing fees. They did not include the costs of management time or changes in cash flows due to shifts in the firm's demand or cost functions, discussed below.

small and are consistent with our belief that bankruptcy costs themselves are unlikely to be the major determinant of corporate capital structures. It is also interesting to note that the annual amount of defaulted funds has fallen significantly since 1940.[63] One possible explanation for this phenomenon is that firms are using mergers to avoid the costs of bankruptcy. This hypothesis seems even more reasonable if, as is frequently the case, reorganization costs represent only a fraction of the costs associated with bankruptcy.

In general, the revenues or the operating costs of the firm are not independent of the probability of bankruptcy and thus the capital structure of the firm. As the probability of bankruptcy increases, both the operating costs and the revenues of the firm are adversely affected, and some of these costs can be avoided by merger. For example, a firm with a high probability of bankruptcy will also find that it must pay higher salaries to induce executives to accept the higher risk of unemployment. Furthermore, in certain kinds of durable-goods industries the demand function for the firm's product will not be independent of the probability of bankruptcy. The computer industry is a good example. There, the buyer's welfare is dependent to a significant extent on the ability to maintain the equipment and on continuous hardware and software development. Furthermore, the owner of a large computer often receives benefits from the software developments of other users. Thus, if the manufacturer leaves the business or loses his software support and development experts because of financial difficulties, the value of the equipment to his users will decline. The buyers of such services have a continuing interest in the manufacturer's viability not unlike that of a bondholder, except that their benefits come in the form of continuing services at lower cost rather than principal and interest payments. Service facilities and spare parts for automobiles and machinery are other examples.

In summary, then, the agency costs associated with debt[64] consist of:

63 T. R. Atkinson, *Trends in Corporate Bond Quality,* Studies in Corporate Bond Finance 4 (New York: National Bureau of Economic Research, 1967).

64 Which, incidentally, exist only when the debt has some probability of default.

1. the opportunity wealth loss caused by the impact of debt on the investment decisions of the firm,
2. the monitoring and bonding expenditures by the bondholders and the owner–manager (i.e., the firm),
3. the bankruptcy and reorganization costs.

Why Are the Agency Costs of Debt Incurred?

We have argued that the owner–manager bears the entire wealth effects of the agency costs of debt and captures the gains from reducing them. Thus, the agency costs associated with debt, discussed above, will tend, in the absence of other mitigating factors, to discourage the use of corporate debt. What are the factors that encourage its use?

One factor is the tax subsidy on interest payments. (This will not explain preferred stock where dividends are not tax-deductible.[65]) Modigliani and Miller originally demonstrated that the use of riskless perpetual debt will increase the total value of the firm (ignoring the agency costs) by an amount equal to τB, where τ is the marginal and average corporate tax rate and B is the market value of the debt. Fama and Miller demonstrate that for the case of risky debt the value of the firm will increase by the market value of the (uncertain) tax subsidy on the interest payments.[66] Again, these gains will accrue entirely to the equity and will provide an incentive to utilize debt to the point where the marginal

65 Our theory is capable of explaining why, in the absence of the tax subsidy on interest payments, we would expect to find firms using both debt and preferred stocks—a problem that has long puzzled at least one of the authors. If preferred stock has all the characteristics of debt except for the fact that its holders cannot put the firm into bankruptcy in the event of nonpayment of the preferred dividends, then the agency costs associated with the issuance of preferred stock will be lower than those associated with debt by the present value of the bankruptcy costs.

However, these lower agency costs of preferred stock exist only over some range if, as the amount of such stock rises, the incentive effects caused by their existence impose value reductions that are larger than those caused by debt (including the bankruptcy costs of debt). There are two reasons for this. First, the equityholders' claims can be eliminated by the debtholders in the event of bankruptcy, and second, the debtholders have the right to fire the management in the event of bankruptcy. Both of these will tend to become more important as an advantage to the issuance of debt as we compare situations with large amounts of preferred stock to equivalent situations with large amounts of debt, because they will tend to reduce the incentive effects of large amounts of preferred stock.

66 Modigliani and Miller, "Corporate Income Taxes"; Fama and Miller, *Theory of Finance,* chap. 4.

wealth benefits of the tax subsidy are just equal to the marginal wealth effects of the agency costs discussed above.

Even in the absence of these tax benefits, however, debt would be utilized if the ability to exploit potentially profitable investment opportunities were limited by the resources of the owner. If the owner of a project cannot raise capital, he will suffer an opportunity loss represented by the increment in value offered to him by the additional investment opportunities. Thus, even though he will bear the agency costs from selling debt, he will find it desirable to incur them to obtain additional capital as long as the marginal wealth increments from the new investment projects are greater than the marginal agency costs of debt and these agency costs are, in turn, less than those caused by the sale of additional equity, discussed in section 2. Furthermore, this solution is optimal from the social viewpoint. However, in the absence of tax subsidies on debt, these projects must be unique to this firm,[67] or they would be taken by other competitive entrepreneurs (perhaps new ones) who possessed the requisite personal wealth to fully finance the projects[68] and were therefore able to avoid the existence of debt or outside equity.

5. A Theory of the Corporate Ownership Structure

In the previous sections we discussed the nature of agency costs associated with outside claims on the firm—both debt

67 One other condition also has to hold to justify the incurrence of the costs associated with the use of debt or outside equity in our firm. If there are other individuals in the economy who have sufficiently large amounts of personal capital to finance the entire firm, our capital-constrained owner can realize the full capital value of his current and prospective projects and avoid the agency costs by simply selling the firm (i.e., the right to take these projects) to one of these individuals. He will then avoid the wealth losses associated with the agency costs caused by the sale of debt or outside equity. If no such individuals exist, it will pay him (and society) to obtain the additional capital in the debt market. This implies, incidentally, that it is somewhat misleading to speak of the owner–manager as the individual who bears the agency costs. One could argue that it is the project that bears the costs, since if it is not sufficiently profitable to cover all the costs (including the agency costs), it will not be taken. We continue to speak of the owner–manager bearing these costs to emphasize the more correct and important point that he has the incentive to reduce them because, if he does, his wealth will be increased.

68 We continue to ignore for the moment the additional complicating factor involved with the portfolio decisions of the owner and the implied acceptance of potentially diversifiable risk by such 100 percent owners in this example.

and equity. Our purpose here is to integrate these concepts into the beginnings of a theory of the corporate ownership structure. We use the term *ownership structure* rather than *capital structure* to highlight the fact that the crucial variables to be determined are not just the relative amounts of debt and equity but also the fraction of the equity held by the manager. Thus, for a given size firm we want a theory to determine three variables:[69]

S_i : inside equity (held by the manager),
S_o : outside equity (held by anyone outside of the firm),
B : debt (held by anyone outside of the firm).

The total market value of the equity is $S = S_i + S_o$, and the total market value of the firm is $V = S + B$. In addition, we also wish to have a theory that determines the optimal size of the firm, that is, its level of investment.

The Optimal Ratio of Outside Equity to Debt

Consider first the determination of the optimal ratio of outside equity to debt, S_o/B. To do this, let us hold the size of the firm constant. V, the actual value of the firm for a given size, will depend on the agency costs incurred; hence, for our index of size we use V^*, the value of the firm at a given scale when agency costs are zero. For the moment we also hold the amount of outside financing, $B + S_o$, constant. Given that a specified amount of financing, $B + S_o$, is to be obtained externally, our problem is to determine the optimal fraction $E^* \equiv S_o^*/(B + S_o)$ to be financed with equity.

We argued above that, (1) as long as capital markets are efficient (i.e., characterized by rational expectations), the prices of assets such as debt and outside equity will reflect unbiased estimates of the monitoring costs and redistributions that the agency relationship will engender, and (2) the selling owner–manager will bear these agency costs. Thus, from the owner–manager's standpoint the optimal proportion of outside funds to be obtained from equity (versus debt) *for a given level of internal equity* is that E which results in minimum total agency costs.

69 We continue to ignore such instruments as convertible bonds and warrants.

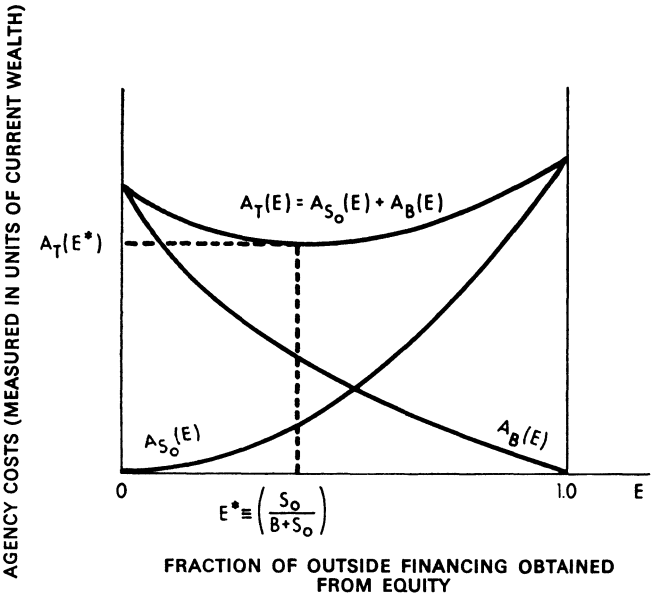

Figure 5. Total agency costs, $A_T(E)$, as a function of the ratio of outside equity to total outside financing, $E \equiv S_o/(B+S_o)$, for a given firm size V^* and given total amounts of outside financing, $B+S_o$. $A_{S_o}(E) \equiv$ agency costs associated with outside equity, $A_B(E) \equiv$ agency costs associated with debt, B. $A_T(E^*) =$ minimum total agency costs at optimal fraction of outside financing E^*.

Figure 5 presents a breakdown of the agency costs into two separate components: Define $A_{S_o}(E)$ as the total agency costs (a function of E) associated with the "exploitation" of the outside equityholders by the owner–manager, and define $A_B(E)$ as the total agency costs associated with the presence of debt in the ownership structure. $A_T(E) = A_{S_o}(E)+A_B(E)$ is the total agency cost.

Consider the function $A_{S_o}(E)$. When $E \equiv S_o/(B+S_o)$ is zero—that is, when there is no outside equity—the manager's incentives to exploit the outside equity is at a minimum (zero), since the changes in the value of the *total* equity are equal to the changes in *his* equity.[70] As E increases to 100

70 Note, however, that even when outsiders own none of the equity, if there is any risky debt outstanding, the stockholder–manager still has some incentives to engage

percent, his incentives to exploit the outside equityholders increase, and hence the agency costs $A_{S_0}(E)$ increase.

The agency costs associated with the existence of debt, $A_B(E)$, are composed mainly of the value reductions in the firm and the monitoring costs caused by the manager's incentive to reallocate wealth from the bondholders to himself by increasing the value of his equity claim. They are at a maximum where all outside funds are obtained from debt, that is, where $S_0 = E = 0$. As the amount of debt declines to zero, these costs also go to zero, because as E goes to 1, his incentive to reallocate wealth from the bondholders to himself falls. These incentives fall for two reasons: (1) the total amount of debt falls, and therefore it is more difficult to reallocate any given amount away from the debtholders; (2) his share of any accomplished reallocation is falling, since S_0 is rising and therefore $S_i/(S_0+S_i)$, his share of the total equity, is falling.

The curve $A_T(E)$ represents the sum of the agency costs from various combinations of outside equity and debt financing, and as long as $A_{S_0}(E)$ and $A_B(E)$ are as we have drawn them, the minimum total agency cost for a given size firm and outside financing will occur at some point such as $A_T(E^*)$ with a mixture of both debt and equity.[71]

Before proceeding further, we issue a caveat. The exact shape of the functions drawn in figure 5 and several others discussed below is essentially an open question at this time. In the end, their shape is a question of fact and can only be

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in activities yielding him nonpecuniary benefits but reducing the value of the firm by more than he personally values the benefits. Any such actions that reduce the value of the firm, V, tend to reduce the value of the bonds as well as the value of the equity. Although the option-pricing model does not in general apply exactly to the problem of valuing the debt and equity of the firm, it can be useful in obtaining some qualitative insights into matters such as this. In that model, $\partial S/\partial V$ indicates the rate at which the stock value changes per dollar change in the value of the firm (and similarly for $\partial B/\partial V$). Both of these terms are less than unity (see Black and Scholes, "Pricing of Options"). Therefore, any action of the manager that reduces the value of the firm, V, tends to reduce the value of both the stock and the bonds, and the larger is the total debt-equity ratio, the smaller is the impact of any given change in V on the value of the equity and, therefore, the lower is the cost to him of consuming nonpecuniary benefits.

71 This occurs, of course, not at the intersection of $A_{S_0}(E)$ and $A_B(E)$, but at the point where the absolute value of the slopes of the functions are equal, i.e., where $A'_{S_0}(E) + A'_B(E) = 0$.

settled by empirical evidence. We outline some a priori arguments that we believe lead to some plausible hypotheses about the behavior of the system, but confess that we are far from understanding the many conceptual subtleties of the problem. We are fairly confident of our arguments regarding the signs of the first derivatives of the functions, but the second derivatives are also important to the final solution, and much more work (both theoretical and empirical) is required before we can have much confidence regarding these parameters. We anticipate the work of others as well as our own to cast more light on these issues. Moreover, we suspect the results of such efforts will generate revisions of the details of what follows. We believe it is worthwhile to delineate the overall framework in order to demonstrate, if only in a simplified fashion, how the major pieces of the puzzle fit together into a cohesive structure.

Effects of the Scale of Outside Financing

In order to investigate the effects of increasing the amount of outside financing, $B+S_0$, and therefore reducing the amount of equity held by the manager, S_1, we continue to hold the scale of the firm, V^*, constant. Figure 6 presents a plot of the agency cost functions, $A_{S0}(E)$, $A_B(E)$, and $A_T(E) = A_{S0}(E)+A_B(E)$, for two different levels of outside financing. Define an index of the amount of outside financing to be

$$K = (B+S_0)/V^*,$$

and consider two different possible levels of outside financing K_0 and K_1 for a given scale of the firm such that $K_0 < K_1$.

As the amount of outside equity increases, the owner's fractional claim on the firm, α, falls. He will be induced thereby to take additional nonpecuniary benefits out of the firm because his share of the cost falls. This also increases the marginal benefits from monitoring activities and therefore will tend to increase the optimal level of monitoring. Both of these factors will cause the locus of agency costs $A_{S0}(E; K)$ to shift upward as the fraction of outside financing, K, increases. This is depicted in figure 6 by the two curves representing the agency costs of equity, one for the low level

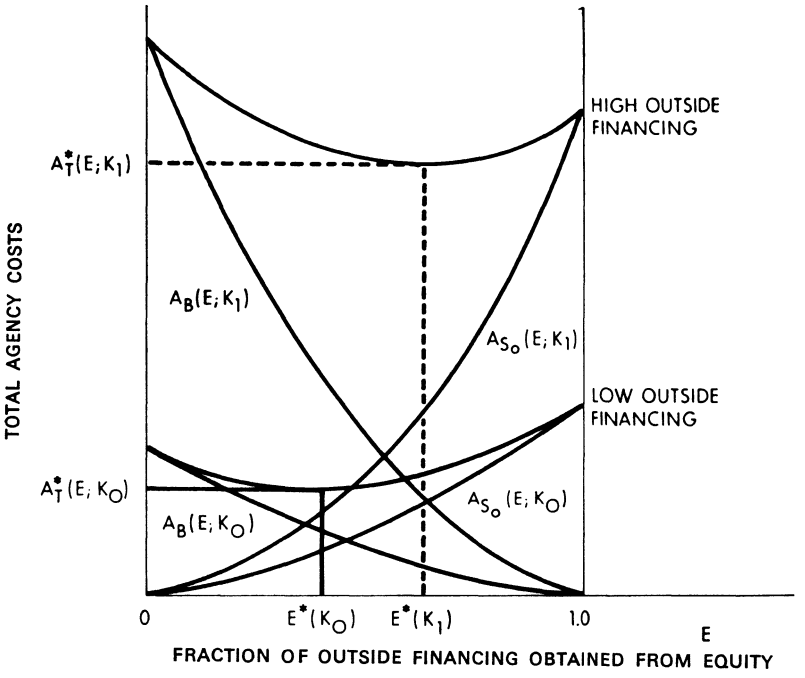

Figure 6. Agency cost functions and optimal outside equity as a fraction of total outside financing, $E^*(K)$, for two different levels of outside financing, K, for a given size firm, V^*: $K_1 > K_o$.

of outside financing, $A_{So}(E;\ K_o)$, the other for the high level of outside financing, $A_{So}(E;\ K_1)$. The locus of the latter lies above the former everywhere except at the origin, where both are 0.

The agency cost of debt will similarly rise as the amount of outside financing increases. This means that the locus of $A_B(E;\ K_1)$ for high outside financing, K_1, will lie above the locus of $A_B(E;\ K_o)$ for low outside financing, K_o, because the total amount of resources that can be reallocated from bondholders increases as the total amount of debt increases. However, since these costs are zero when the debt is zero for both K_o and K_1, the intercepts of the $A_B(E;\ K)$ curves coincide at the right axis.

The net effect of the increased use of outside financing given the cost functions assumed in figure 6 is to: (1) increase

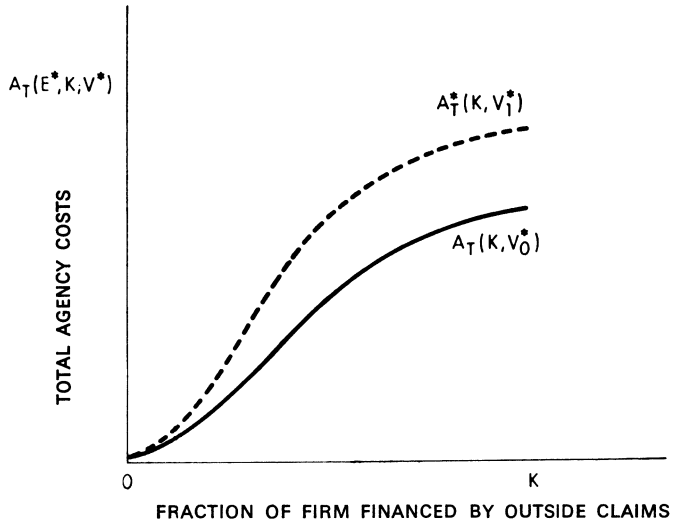

Figure 7. Total agency costs as a function of the fraction of the firm financed by outside claims for two firm sizes, $V_1^* > V_0^*$

the total agency costs from $A_T(E^*; K_0)$ to $A_T(E^*; K_1)$, and (2) to increase the optimal fraction of outside funds obtained from the sale of outside equity. We draw these functions for illustration only and are unwilling to speculate at this time on the exact form of $E^*(K)$ that gives the general effect of increasing outside financing on the relative quantities of debt and equity.

The locus of points, $A_T(E^*; K)$, where agency costs are minimized (not drawn in fig. 6) determines $E^*(K)$, the optimal proportions of equity and debt to be used in obtaining outside funds as the fraction of outside funds, K, ranges from 0 to 100 percent. The solid line in figure 7 is a plot of the minimum total agency costs as a function of the amount of outside financing for a firm with scale V_0^*. The dotted line shows the total agency costs for a larger firm with scale $V_1^* > V_0^*$. That is, we hypothesize that the larger the firm becomes, the larger are the total agency costs because it is likely that the monitoring function is inherently more difficult and expensive in a larger organization.

Risk and the Demand for Outside Financing

The model we have used to explain the existence of minority shareholders and debt in the capital structure of corporations implies that the owner–manager, if he resorts to any outside funding, will have his entire wealth invested in the firm. The reason is that he can thereby avoid the agency costs imposed by additional outside funding. This suggests that he would not resort to outside funding until he had invested in the firm 100 percent of his personal wealth—an implication that is not consistent with what we generally observe. Most owner–managers hold personal wealth in a variety of forms, and some have only a relatively small fraction of their wealth invested in the corporation they manage.[72] Diversification on the part of owner–managers can be explained by risk aversion and optimal portfolio selection.

If the returns from assets are not perfectly correlated, an individual can reduce the riskiness of the returns on his portfolio by dividing his wealth among many different assets, that is, by diversifying.[73] Thus a manager who invests all of his wealth in a single firm (his own) will generally bear a welfare loss (if he is risk averse) because he is bearing more risk than necessary. He will, of course, be willing to pay something to avoid this risk, and the costs he must bear to accomplish this diversification will be the agency costs outlined above. He will suffer a wealth loss as he reduces his fractional ownership because prospective shareholders and bondholders will take into account the agency costs. Nevertheless, the manager's desire to avoid risk will contribute to his becoming a minority stockholder.

The Optimal Amount of Outside Financing, K^*

Assume for the moment that the owner of a project (i.e., the owner of a prospective firm) has enough wealth to finance the entire project himself. The optimal scale of the corpora-

72 On the average, however, top managers seem to have substantial holdings in absolute dollars. A survey by Wytmar (*Wall Street Journal,* August 13, 1974, p. 1) found that the median value of 826 chief executive officers' stock holdings in their companies at year end 1973 was $557,000 and $1.3 million at year end 1972.

73 These diversification effects can be substantial. It has been shown that on the average, for New York Stock Exchange securities, approximately 55 percent of the total risk (as measured by standard deviation of portfolio returns) can be eliminated

tion is then determined by the condition that $\Delta V - \Delta I = 0$. In general, if the returns to the firm are uncertain, the owner–manager can increase his welfare by selling off part of the firm either as debt or equity and reinvesting the proceeds in other assets. If he does this with the optimal combination of debt and equity (as in fig. 6) the total wealth reduction he will incur is given by the agency cost function, $A_T(E^*, K; V^*)$ in figure 7. The functions $A_T(E^*, K; V^*)$ will be S-shaped (as drawn) if total agency costs for a given scale of firm increase at an increasing rate at low levels of outside financing and at a decreasing rate for high levels of outside financing as monitoring imposes more and more constraints on the manager's actions.

Figure 8 shows marginal agency costs as a function of K, the fraction of the firm financed with outside funds assuming the total agency cost function is as plotted in figure 7 and assuming the scale of the firm is fixed. The demand by the owner–manager for outside financing is shown by the remaining curve in figure 8. This curve represents the marginal value of the increased diversification that the manager can obtain by reducing his ownership claims and optimally constructing a diversified portfolio. It is measured by the amount he would pay to be allowed to reduce his ownership claims by a dollar in order to increase his diversification. If the liquidation of some of his holdings also influences the owner–manager's consumption set, the demand function plotted in figure 8 also incorporates the marginal value of these effects. The intersection of these two schedules determines the optimal fraction of the firm to be held by outsiders, and this in turn determines the total agency costs borne by the owner. This solution is Pareto-optimal; there is no way to reduce the agency costs without making someone worse-off.

The Optimal Scale of the Firm

While the details of the solution of the optimal scale of the firm are complicated when we allow for the issuance of debt, equity, and monitoring and bonding, the general structure

by following a naïve strategy of dividing one's assets equally among 40 randomly selected securities. J. L. Evans and S. H. Archer, "Diversification and the Reduction of Dispersion: An Empirical Analysis," *Journal of Finance* 23 (1968): 761–768.

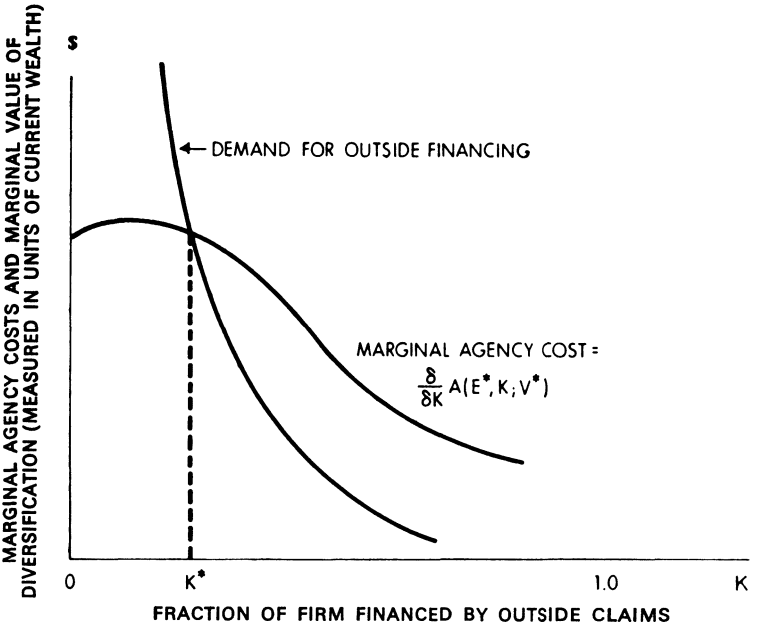

Figure 8. Determination of the optimal amount of outside financing, K^*, for a given scale of firm

of the solution is analogous to the case in which monitoring and bonding are allowed for the outside equity example (see fig. 4).

If it is optimal to issue any debt, the expansion path taking full account of such opportunities must lie above the curve ZG in figure 4. If this new expansion path lies anywhere to the right of the indifference curve passing through point G, debt will be used in the optimal financing package. Furthermore, the optimal scale of the firm will be determined by the point at which this new expansion path touches the highest indifference curve. In this situation the resulting level of the owner–manager's welfare must, therefore, be higher.

6. Qualifications and Extensions of the Analysis

Multiperiod Aspects of the Agency Problem

We have assumed throughout our analysis that we are dealing only with a single investment-financing decision by the

entrepreneur and have ignored the issues associated with the incentives affecting future financing–investment decisions that might arise after the initial set of contracts are consummated between the entrepreneur–manager, outside stockholders, and bondholders. These are important issues left for future analysis.[74] Their solution will undoubtedly introduce some changes in the conclusions of the single-decision analysis. It seems clear, for instance, that the expectation of future sales of outside equity and debt will change the costs and benefits facing the manager in making decisions that benefit himself at the (short-run) expense of the current bondholders and stockholders. If he develops a reputation for such dealings, he can expect this to influence unfavorably the terms at which he can obtain future capital from outside sources. This will tend to increase the benefits associated with "sainthood" and will tend to reduce the size of the agency costs. Given the finite life of any individual, however, such an effect cannot reduce these costs to zero, because at some point these future costs will begin to weigh more heavily on his successors, and therefore the relative benefits to him of acting in his own best interests will rise.[75] Furthermore, it will generally be impossible for him to fully guarantee to the outside interests that his successor will continue to follow his policies.

The Control Problem and Outside Owner's Agency Costs

The careful reader will notice that nowhere in the analysis thus far have we taken into account many of the details of the relationship between the part owner–manager and the outside stockholders and bondholders. In particular, we have assumed that all outside equity is nonvoting. If such equity does have voting rights, then the manager will be

74 The recent work of Myers, "Corporate Debt Capacity," which views future investment opportunities as options and investigates the incentive effects of the existence of debt in such a world where a sequence of investment decisions is made, is another important step in the investigation of the multiperiod aspects of the agency problem and the theory of the firm.

75 A special case of this problem, involving the use of nonvested pension rights to help correct for this end-game play in the law enforcement area, is analyzed by G. S. Becker and G. J. Stigler, "Law Enforcement, Corruption and Compensation of Enforcers" (Paper presented at the Conference on Capitalism and Freedom, Charlottesville, Va., Oct. 1972).

concerned about the effects on his long-run welfare of reducing his fractional ownership below the point at which he loses effective control of the corporation—that is, below the point at which it becomes possible for the outside equityholders to fire him. A complete analysis of this issue will require a careful specification of the contractual rights involved on both sides, the role of the board of directors, and the coordination (agency) costs borne by the stockholders in implementing policy changes. This latter point involves consideration of the distribution of the outside ownership claims. Simply put, forces exist to determine an equilibrium distribution of outside ownership. If the costs of reducing the dispersion of ownership are lower than the benefits to be obtained from reducing the agency costs, it will pay some individual or group of individuals to buy shares in the market to reduce the dispersion of ownership. We occasionally witness these conflicts for control, which involve outright market purchases, tender offers, and proxy fights. Further analysis of these issues is left to the future.

Inside Debt and the Use of Convertible Financial Instruments

We have been asked why debt held by the manager (i.e., "inside debt") plays no role in our analysis.[76] We have as yet been unable to formally incorporate this dimension into our analysis in a satisfactory way. The question is a good one and suggests some potentially important extensions of the analysis. For instance, it suggests an inexpensive way for the owner–manager with both equity and debt outstanding to eliminate a large part (perhaps all) of the agency costs of debt. If he binds himself contractually to hold a fraction of the total debt equal to his fractional ownership of the total equity, he would have no incentive whatsoever to reallocate wealth from the debtholders to the stockholders. Consider the case where

$$B_i/S_i = B_o/S_o, \tag{4}$$

where S_i and S_o are as defined earlier, B_i is the dollar value of the inside debt held by the owner–manager, and B_o is the

76 By our colleague David Henderson.

debt held by outsiders. In this case, if the manager changes the investment policy of the firm to reallocate wealth between the debt- and equityholders, the net effect on the total value of his holdings in the firm will be zero. Therefore, his incentives to perform such reallocations are zero.[77]

Why, then, don't we observe practices or formal contracts that accomplish this elimination or reduction of the agency costs of debt? Maybe we do for smaller privately held firms (we haven't attempted to obtain these data), but for large diffuse owner corporations the practice does not seem to be common. One reason for this, we believe, is that in some respects the claim that the manager holds on the firm in the form of his wage contract has some of the characteristics of debt.[78] If true, this implies that, even with zero holdings of formal debt claims, he still has positive holdings of a quasi-debt claim, and this may accomplish the satisfaction of condition (4). The problem here is that any formal analysis of this issue requires a much deeper understanding of the relationship between formal debt holdings and the wage contract; that is, how much debt is it equivalent to?

This line of thought also suggests some other interesting issues. Suppose the implicit debt characteristics of the manager's wage contract result in a situation equivalent to

$$B_i/S_i > B_o/S_o.$$

Then he would have incentives to change the operating characteristics of the firm (i.e., reduce the variance of the outcome distribution) to transfer wealth from the stockholders to the debtholders, which is the reverse of the situation we examined in section 4. Furthermore, this seems to capture some of the concern often expressed regarding the fact that managers of large publicly held corporations seem to behave

77 This also suggests that *some* outside debtholders can protect themselves from "exploitation" by the manager by purchasing a fraction of the total equity equal to their fractional ownership of the debt. All debtholders, of course, cannot do this unless the manager does so also. In addition, such an investment rule restricts the portfolio choices of investors and therefore would impose costs if followed rigidly. Thus, the agency costs will not be eliminated this way either.

78 Consider the stituation in which the bondholders have the right in the event of bankruptcy to terminate his employment and therefore to terminate the future returns to any specific human capital or rents he may be receiving.

in a risk-averse way, to the detriment of the equityholders. One solution to this would be to establish incentive compensation systems for the manager or to give him stock options, which in effect give him a claim on the upper tail of the outcome distribution. This also seems to be a commonly observed phenomenon.

This analysis also suggests some additional issues regarding the costs and benefits associated with the use of more complicated financial claims such as warrants, convertible bonds, and convertible preferred stock, which we have not formally analyzed as yet. These have some of the characteristics of nonvoting shares, although they can be converted into voting shares under some terms. Alchian and Demsetz provide an interesting analysis regarding the use of nonvoting shares.[79] They argue that some shareholders with strong beliefs in the talents and the judgments of the manager will want to be protected against the possibility that some other shareholders will take over and limit the actions of the manager (or fire him). Given that the securities exchanges prohibit the use of nonvoting shares by listed firms, the use of option-like securities might be a substitute for these claims.

In addition, warrants represent a claim on the upper tail of the distribution of outcomes, and convertible securities can be thought of as securities with nondetachable warrants. It seems that the incentive effects of warrants would tend to offset to some extent the incentive effects of the existence of risky debt, because the owner–manager would be sharing with the warrant holders part of the proceeds associated with a shift in the distribution of returns. Thus, we conjecture that potential bondholders will find it attractive to have warrants attached to the risky debt of firms in which it is relatively easy to shift the distribution of outcomes to expand the upper tail of the distribution and transfer wealth from bondholders. It would then be attractive also to the owner–manager because of the reduction in the agency costs that he would bear. This argument also implies that it would make little difference if the warrants were detachable (and therefore saleable separately from the bonds), since their mere existence would reduce the incentives of the manager (or stockholders) to increase the riskiness of the firm (and there-

79 Alchian and Demsetz, "Production."

fore increase the probability of bankruptcy). Furthermore, the addition of a conversion privilege to fixed claims such as debt or preferred stock would also tend to reduce the incentive effects of the existence of such fixed claims and therefore lower the agency costs associated with them. The theory predicts that these phenomena should be more frequently observed when the incentive effects of such fixed claims are high than when they are low.

Monitoring and the Social Product of Security Analysts

One of the areas in which further analysis is likely to lead to high payoffs is that of monitoring. We currently have little that could be glorified by the title of a "theory of monitoring," and yet this is a crucial building block of the analysis. We would expect monitoring activities to become specialized to those institutions and individuals who possess comparative advantages in these activities. A large role in these activities seems to be played by the security analysts employed by institutional investors, brokers, and investment advisory services, as well as by individual investors in the normal course of investment decision making.

A large body of evidence indicates that security prices incorporate in an unbiased manner all publicly available information and much of what might be called "private information."[80] There is also a large body of evidence indicating that the security-analysis activities of mutual funds and other institutional investors are not reflected in portfolio returns; that is, they do not increase risk-adjusted portfolio returns over a naïve random-selection, buy-and-hold strategy.[81] Therefore, some have been tempted to conclude that the resources expended on such research activities to find under- or overvalued securities is a social loss. Jensen argues, however, that this conclusion cannot be unambiguously drawn because there is a large consumption element in the demand for these services.[82]

80 See E. F. Fama, "Efficient Capital Markets: A Review of Theory and Empirical Work," *Journal of Finance* 25 (1970): 383–417.

81 For an example of this evidence and for references, see M. C. Jensen, "Risk, the Pricing of Capital Assets, and the Evaluation of Investment Portfolios," *Journal of Business* 42 (1969): 167–247.

82 M. C. Jensen, "Tests of Capital Market Theory and Implications of the Evidence," Graduate School of Management Working Paper Series no. 7414 (Rochester, N.Y.: University of Rochester, 1974).

Furthermore, the analysis of this paper would seem to indicate that, to the extent that security-analysis activities reduce the agency costs associated with the separation of ownership and control, they are indeed socially productive. Moreover, if this is true, we expect the major benefits of these activities to be reflected in the higher capitalized value of the ownership claims to corporations and *not* in the period-to-period portfolio returns of the analyst. Equilibrium in the security-analysis industry requires that the private returns to analysis (i.e., portfolio returns) must be just equal to the private costs of such activity,[83] and this will not reflect the social product of this activity, which will consist of larger output and higher *levels* of the capital value of ownership claims. Therefore, the argument implies that if there is a nonoptimal amount of security analysis being performed, it is too much,[84] not too little (since the shareholders would be willing to pay directly to have the "optimal" monitoring performed, and we don't seem to observe such payments).

Specialization in the Use of Debt and Equity

Our previous analysis of agency costs suggests at least one other testable hypothesis—that in those industries in which the incentive effects of outside equity or debt are widely different, we would see specialization in the use of the low–agency cost financing arrangement. In industries in which it is relatively easy for managers to lower the mean value of the outcomes of the enterprise by outright theft, special treatment of favored customers, consumption of leisure on the job, etc. (for example, the bar and restaurant industry), we would expect to see the ownership structure of firms characterized by relatively little outside equity (i.e., 100 percent ownership of the equity by the manager), with almost all outside capital obtained through the use of debt.

The theory predicts that the opposite would be true when the incentive effects of debt are large relative to the incentive effects of equity. Firms like conglomerates, in which it would be easy to shift outcome distributions adversely for bondholders (by changing the acquisition or divestiture policy),

83 Ignoring any pure consumption elements in the demand for security analysis.

84 Again ignoring the value of the pure consumption elements in the demand for security analysis.

should be characterized by relatively lower utilization of debt. Conversely, in industries in which the freedom of management to take riskier projects is severely constrained (for example, regulated industries such as public utilities) we should find more intensive use of debt financing.

The analysis suggests that, in addition to the fairly well understood role of uncertainty in the determination of the quality of collateral, there is at least one other element of great importance—the ability of the owner of the collateral to change the distribution of outcomes by shifting either the mean outcome or the variance of the outcomes. A study of bank lending policies should reveal these to be important aspects of the contractual practices observed there.

The Large Diffuse-Ownership Corporation

While we believe the structure outlined in the preceding pages is applicable to a wide range of corporations, it is still in an incomplete state. One of the most serious limitations of the analysis as it stands is that we have not worked out in this paper its application to the very large modern corporation whose managers own little or no equity. We believe our approach can be applied to this case, but space limitations preclude discussion of these issues here. They remain to be worked out in detail and will be included in a future paper.

The Supply Side of the Incomplete Markets Question

The analysis of this paper is also relevant to the incomplete market issue.[85] The problems addressed in this literature derive from the fact that, whenever the available set of financial claims on outcomes in a market fails to span the underlying state space, the resulting allocation is Pareto-inefficient.[86] A disturbing element in this literature is that the

85 See, among others, K. J. Arrow, "Role of Securities"; P. A. Diamond, "The Role of a Stock Market in a General Equilibrium Model with Technological Uncertainty," *American Economic Review* 57 (1967): 759–76; N. H. Hakansson, "The Superfund: Efficient Paths toward a Complete Financial Market," unpublished (University of California, Berkeley, 1974); idem, "Ordering Markets and the Capital Structures of Firms with Illustrations," Institute of Business and Economic Research Working Paper no. 24 (Berkeley: University of California, 1974); M. Rubenstein, "A Discrete-Time Synthesis of Financial Theory," ibid., nos. 20, 21 (1974); S. A. Ross, "Options and Efficiency," Rodney L. White Center for Financial Research Working Paper no. 3-74 (Philadelphia: University of Pennsylvania, 1974).

86 See Arrow, "Role of Securities," and Debreu, *Theory of Value.*

inefficiency conclusion is generally drawn without explicit attention in the analysis to the costs of creating new claims or of maintaining the expanded set of markets called for to bring about the welfare improvement.

The demonstration of a possible welfare improvement from the expansion of the set of claims by the introduction of new basic contingent claims or options can be thought of as an analysis of the demand conditions for new markets. Viewed from this perspective, what is missing in the literature on this problem is the formulation of a positive analysis of the supply of markets (or the supply of contingent claims). That is, what is it in the maximizing behavior of individuals in the economy that causes them to create and sell contingent claims of various sorts?

The analysis in this paper can be viewed as a small first step in the direction of formulating such an analysis based on the self-interested maximizing behavior of individuals. We have shown why it is in the interest of a wealth-maximizing entrepreneur to create and sell claims such as debt and equity. Furthermore, as we have indicated above, it appears that extensions of these arguments will lead to a theory of the supply of warrants, convertible bonds, and convertible preferred stock. We are not suggesting that the specific analysis offered above is likely to be sufficient to lead to a theory of the supply of the wide range of contracts (both existing and merely potential) in the world at large. However, we do believe that framing the question of the completeness of markets in terms of the joining of both the demand and supply conditions, instead of implicitly assuming that new claims spring forth from some (costless) wellhead of creativity unaided or unsupported by human effort, will be very fruitful.

7. Conclusions

The publicly held business corporation is an awesome social invention. Millions of individuals voluntarily entrust billions of dollars, francs, pesos, etc., of personal wealth to the care of managers on the basis of a complex set of contracting relationships that delineate the rights of the parties involved. The growth in the use of the corporate form as well as the

growth in market value of established corporations suggest that, at least up to the present, creditors and investors have by and large not been disappointed with the results, despite the agency costs inherent in the corporate form.

Agency costs are as real as any other costs. The level of agency costs depends, among other things, on statutory and common law and human ingenuity in devising contracts. Both the law and the sophistication of contracts relevant to the modern corporation are the products of a historical process in which there were strong incentives for individuals to minimize agency costs. Moreover, there were alternative organizational forms available and opportunities to invent new ones. Whatever its shortcomings, the corporation has thus far survived the market test against potential alternatives.