Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure

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Abstract

This paper integrates elements from the theory of agency, the theory of property rights and the theory of finance to develop a theory of the ownership structure of the firm. We define the concept of agency costs, show its relationship to the 'separation and control' issue, investigate the nature of the agency costs generated by the existence of debt and outside equity, demonstrate who bears costs and why, and investigate the Pareto optimality of their existence. We also provide a new definition of the firm, and show how our analysis of the factors influencing the creation and issuance of debt and equity claims is a special case of the supply side of the completeness of markets problem.

> 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.
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> — Adam Smith (1776)

Keywords: Agency costs and theory, internal control systems, conflicts of interest, capital structure, internal equity, outside equity, demand for security analysis, completeness of markets, supply of claims, limited liability

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1. Introduction

1.1. 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[1] for the firm. In addition to tying 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 including 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 problems.

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

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Our theory helps explain:

1. why an entrepreneur or manager in a firm which 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.

1.2 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 actually a theory of the firm but rather 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 which 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, 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, with each attempt motivated by a conviction that the latter is inadequate to explain managerial behavior in large corporations.[3] Some of these reformulation attempts have rejected the fundamental principle of maximizing

[2] Reviews of this literature are given by Peterson (1965), Alchian (1965, 1968), Machlup (1967), Shubik (1970), Cyert and Hedrick (1972), Branch (1973), Preston (1975).

[3] See Williamson (1964, 1970, 1975), Marris (1964), Baumol (1959), Penrose (1958), and Cyert and March (1963). Thorough reviews of these and other contributions are given by Machlup (1967) and Alchian (1965).

Simon (1955) developed a model of human choice incorporating information (search) and computational costs which also has important implications for the behavior of managers. Unfortunately, Simon's work has often been misinterpreted as a denial of maximizing behavior, and misused, especially in the marketing and behavioral science literature. His later use of the term "satisficing" (Simon, 1959) 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.

behavior as well as rejecting the more specific profit-maximizing model. We retain the notion of maximizing behavior on the part of all individuals in the analysis that follows.[4]

1.3 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 extended by Alchian, Demsetz, and others.[5] A comprehensive survey of this literature is given by Furubotn and Pejovich (1972). While the focus of this research has been "property rights",[6] the subject matter encompassed is far broader than that term suggests. 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 affected 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.

1.4 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 in which there is a growing

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[4] See Meckling (1976) for a discussion of the fundamental importance of the assumption of resourceful, evaluative, maximizing behavior on the part of individuals in the development of theory. Klein (1976) takes an approach similar to the one we embark on in this paper in his review of the theory of the firm and the law.

[5] See Coase (1937, 1959, 1960), Alchian (1965, 1968), Alchian and Kessel (1962), Demsetz (1967), Alchian and Demsetz (1972), Monson and Downs (1965), Silver and Auster (1969), and McManus (1975).

[6] Property rights are of course human rights, i.e., rights which 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.

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 which 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 addition in some situations it will pay the *agent* to expend resources (bonding costs) to guarantee that he will not take certain actions which 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 (non-pecuniary as well as pecuniary), and in addition there will be some divergence between the agent's decisions[8] and those decisions which would maximize the welfare of the principal. The dollar equivalent of the reduction in welfare experienced by the principal as a result of 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:

[7] Cf. Berhold (1971), Ross (1973, 1974a), Wilson (1968, 1969), and Heckerman (1975).

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

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

Note also that agency costs arise in any situation involving cooperative effort (such as the co-authoring 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 (1972) raise in their paper on the theory of the firm.

Since the relationship between the stockholders and the managers of a corporation fits the definition of a pure agency relationship, it should come as 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 show below that an explanation of why and how the agency costs generated by the corporate form are born 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,[10] in universities, in mutual companies, in cooperatives, in

[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] 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 which 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

governmental authorities and bureaus, in unions, and in relationships normally classified as agency relationships such as those common in the performing arts and the market for real estate. The development of theories to explain the form which agency costs take in each of these situations (where the contractual relations differ significantly), and how and why they are born will lead to a rich theory of organizations which 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 which will maximize the principal's welfare, given that uncertainty and imperfect monitoring exist. We focus almost entirely on the positive aspects of the theory. 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).

1.5 General Comments on the Definition of the firm

Ronald Coase in his seminal paper entitled "The Nature of the Firm" (1937) pointed out that economics had no positive theory to determine the bounds of the firm. He characterized the

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control' issue because the nature of the contractual obligations and rights of the parties are much more varied 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.

bounds of the firm as that range of exchanges over which the market system was suppressed and where 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. Alchian and Demsetz (1972) object to the notion that activities within the firm are governed by authority, and 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.[11] We are sympathetic to with the importance they attach to monitoring, but we believe the emphasis that Alchian and Demsetz place 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, and so on. The problem of agency costs and monitoring exists for all of these contracts, independent of whether there is joint production in their sense; i.e., joint production can explain only a small fraction of the behavior of individuals associated with a firm.

It is important to recognize that most organizations are simply legal fictions[12] which serve as a nexus for a set of contracting relationships among individuals. This includes firms, non-profit institutions such as universities, hospitals, and foundations, mutual organizations such as mutual savings banks and insurance companies and co-operatives, some private clubs, and even governmental bodies such as cities, states, and the federal government, government enterprises such as TVA, the Post Office, transit systems, and so forth.

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[11] 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.'

[12] By legal fiction we mean the artificial construct under the law which allows certain organizations to be treated as individuals.

The private corporation or firm is simply one form of legal fiction which serves as a nexus for contracting relationships and which is also characterized by the existence of divisible residual claims on the assets and cash flows of the organization which can generally be sold without permission of the other contracting individuals. Although 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.[13]

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 which serves as a focus for a complex process in which the conflicting objectives of individuals (some of whom may "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

[13] 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 can and does have a right to satisfaction. Explicit evidence that such implicit contracts do exist is the practice we occasionally observe of specific provision that 'all sales are final.'

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.[14]

1.6 Overview of the Paper

We develop our 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. In Section 3, we pose some questions regarding the existence of the corporate form of organization and examines the role of limited liability. Section 5 provides a synthesis of the basic concepts derived in sections 2-4 into a theory of the corporate ownership structure which 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

2.1 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 with his 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

[14] This view of the firm points up the important role which the legal system and the law play in social organizations, especially, the organization of economic activity. Statutory laws 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 non-performance. The courts adjudicate conflicts between contracting parties and establish precedents which 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 Jensen and Meckling (1978) and we shall not pursue them here.

will involve not only the benefits he derives from pecuniary returns but also the utility generated by various non-pecuniary aspects of his entrepreneurial activities such as the physical appointments of the office, the attractiveness of the office staff, the level of employee discipline, the kind and amount of charitable contributions, personal relations ("friendship," "respect," and so on) with employees, a larger than optimal computer to play with, or purchase of production inputs from friends. The optimum mix (in the absence of taxes) of the various pecuniary and non-pecuniary benefits is achieved when the marginal utility derived from an additional dollar of expenditure (measured net of any productive effects) is equal for each non-pecuniary 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 which are identical to his own (i.e., which share proportionately in the profits of the firm and have limited liability), agency costs will be generated by the divergence between his interest and those of the outside shareholders, since he will then bear only a fraction of the costs of any non-pecuniary 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 so 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 which 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[15] 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. However, we do not mean to leave the impression 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 the anxieties that go with them also represent 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.

2.2 A Simple Formal Analysis of the Sources of Agency Costs of Equity and Who Bears Them

In order to develop some structure for the analysis to follow we make two sets of assumptions. The first set (permanent assumptions) are those which will carry through almost all of the analysis in sections 2-5. The effects of relaxing some of these are discussed in section 6.

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[15] For use in consumption, for the diversification of his wealth, or more importantly, for the financing of 'profitable' projects which 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.

The second set (temporary assumptions) are made only for expositional purposes and are relaxed as soon as the basic points have been clarified.

Permanent assumptions

(P.1) All taxes are zero.

(P.2) No trade credit is available.

(P.3) All outside equity shares are non-voting.

(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 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 non-pecuniary benefits;[16] 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.

Ignoring 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 $X \geq X^*$ (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 which generate utility to the manager. We assume henceforth that for any given level of cost to the firm, F, the vector of factors and activities on which F is spent on those, $\hat{X}$, which yield the manager maximum utility. Thus $F \equiv B(X^*) - B(\hat{X})$.

[16] Such as office space, air conditioning, thickness of the carpets, friendliness of employee relations, etc.

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 between 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.[17]

Given the definition of F as the current market value of the stream of manager's expenditures on non-pecuniary benefits, we represent the constraint which a single owner-manager faces in deciding how much non-pecuniary income he will extract from the firm by the line $\bar{V}F$ in fig. 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 non-pecuniary benefits, F, is measured along the horizontal axis. $O\bar{V}$ is the value of the firm when the amount of non-pecuniary income consumed is zero. By definition $\bar{V}$ is the 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 non-pecuniary benefits are zero. At this point all the factors and activities within the firm which generate utility for the manager are at the level X^* defined above. There is a different budget constraint $\bar{V}F$ 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

[17] 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.

at the level W^* which represents the current market value of his wage contract[18] in the optimal compensation package which consists of both wages, W^*, and non-pecuniary benefits, F^*. Since one dollar of current value of non-pecuniary 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 non-pecuniary benefits is represented in fig. 1 by a system of indifference curves, U_1, U_2, and so on.[19] The indifference curves will be convex as drawn as long as the owner-manager's marginal rate of substitution between non-pecuniary benefits and wealth diminishes with increasing levels of the benefits. For the 100 percent owner-manager, this presumes that there are not perfect substitutes for these benefits available on the outside, that 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.[20]

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 non-pecuniary benefits consumed is F^*. If the owner sells the entire equity but remains as manager, and if the equity buyer can, at zero

[18] At this stage when we are considering a 100% owner-managed firm the notion of a 'wage contract' with himself has no content. However, the 100% 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.

[19] The manager's utility function is actually defined over wealth and the future time sequence of vectors of quantities of non-pecuniary benefits, X_t. Although the setting of his problem is somewhat different, Fama (1970b, 1972) 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. Such a utility function incorporates the optimization going on in the background which define $\hat{X}$ discussed above for a given F. In the more general case where 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.

[20] 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.

cost, force the old owner (as manager) to take the same level of non-pecuniary benefits as he did as owner, then V^* is the price the new owner will be willing to pay for the entire equity.[21]

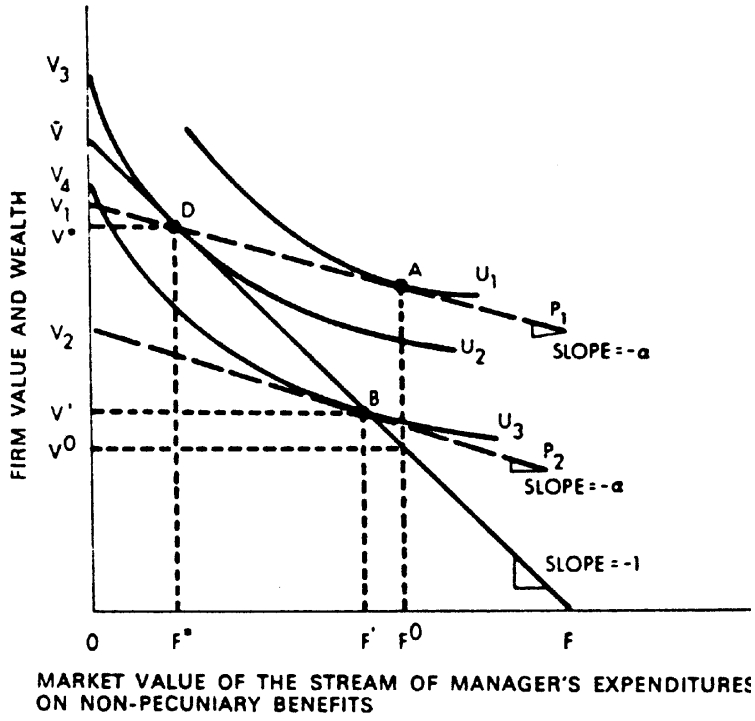

Fig. 1. The value of the firm *(V)* and the level of non-pecuniary benefits consumed (F) when the fraction of outside equity is $(1-\alpha)V$, and $U_j(j = 1,2,3)$ represents owner's indifference curves between wealth and non-pecuniary benefits.

[21] 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 which 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 on 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 which has value which 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.

In general, however, we could 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 non-pecuniary benefits he consumes. Suppose the owner sells a share of the firm, $1-\alpha$, $(0 < \alpha < 1)$ and retains for himself a share, a. If the prospective buyer believes that the owner-manager will consume the same level of non-pecuniary 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 non-pecuniary benefits in the firm will no longer be \$1. Instead, it will be α x \$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 non-pecuniary benefits he liked, his budget constraint would be V_1P_1 in fig. 1 and has 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, V_1P_1, must pass through D, since he can if he wishes have the same wealth and level of non-pecuniary consumption he enjoyed 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 a part owner, his welfare will be maximized by increasing his consumption of non-pecuniary 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 non-pecuniary expenditures, and the owner-manager's consumption of non-pecuniary 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 non-pecuniary 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-a)* the outsider will pay only *(1-a)* 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 that 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_o, made by the outsider for $1-\alpha$ of the equity; the rest, S_i, 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

$$W = S_o + S_i = S_o + \alpha V(F, \alpha),$$

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 non-pecuniary benefits and his wealth after the sale. Given that the owner has decided to sell a claim $1-\alpha$ of the firm, his welfare will be maximized when V_2P_2 is tangent to some indifference curve such as U_3 in fig. 1. A price for a claim of $(1-\alpha)$ on the firm that is satisfactory to both the buyer and the seller will require that this tangency occur along $\overline{VF}$, that is, that the value of the firm must 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 $\overline{VF}$. 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 non-pecuniary benefits will imply a higher value both to the firm as a whole and to the fraction of the firm (1-α) which the outsider has acquired; that is, (1-α)$V' > S_o$. From the owner's viewpoint, he has sold 1-α of the firm for less than he could have, given the (assumed) lower level of non-pecuniary benefits he enjoys. On the other hand, if the tangency point B is to the right of the line $\overline{VF}$, the owner-manager's higher consumption of non-pecuniary benefits means the value of the firm is less than V', and hence (1-α)$V(F, \alpha) < S_o$ = (1-α)V'. The outside owner then has paid more for his share of the equity than it is worth. S_o will be a mutually satisfactory price if and only if (1-α)$V' = S_o$. But this means that the owner's post-sale wealth is equal to the (reduced) value of the firm V', since

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

Q.E.D.

The requirement that V' and F' fall on $\overline{VF}$ 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-α) 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 non-pecuniary benefits ($F'-F^*$). In fig. 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,[22] and he would sell such a claim only if the increment in welfare he achieved by using the cash amounting to $(1-\alpha)V'$ for other things was worth more to him than this amount of wealth.

2.3 Determination of the Optimal Scale of the Firm

The case of 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. Fig. 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 fig. 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 non-pecuniary benefits, F. Let $\overline{V}(I)$ represent the value of the firm as a function of the level of investment when the manager's expenditures on non-pecuniary benefits, F, are zero. The schedule with intercept labeled $W + [\overline{V}(I^*) - I^*)]$ and slope equal to -1 in fig. 2 represents the locus of combinations of post-investment wealth and dollar cost to thefirm of non-pecuniary benefits which are available to the manager when investment is carried to the value maximizing point, I^*. At this point $\Delta\overline{V}(I) - \Delta I = 0$. 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 non-pecuniary

[22] The distance V^*-V' is a measure of what we will define as the 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 which will be minimized by the manager in the general case where we allow investment to change.

benefits and have pecuniary wealth with value $W + V^*-I^*$. However, if outside financing is required to cover the investment he will not reach this point if monitoring costs are non-zero.[23]

The expansion path *OZBC* represents the equilibrium combinations of wealth and non-pecuniary benefits, *F*, which 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* which present 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 non-pecuniary benefits retraces (in the reverse direction) the curve *OZBC*. We draw the path as a smooth concave function only as a matter of convenience.

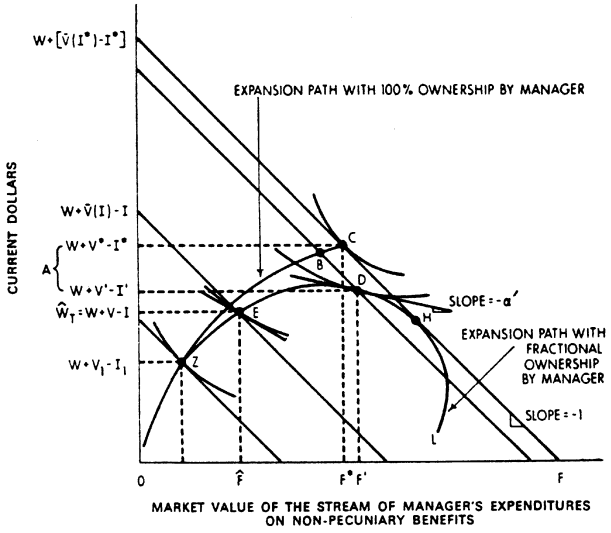

Fig. 2. Determination of the optimal scale of the firm in the case where no monitoring takes place. Point *C* denotes optimum investment, I^*, and non-pecuniary benefits, F^*, when investment is 100% financed by entrepreneur. Point *D* denotes optimum investment, *I'*, and non-pecuniary benefits, *F*, 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.

[23] I^* is the value maximizing and Pareto Optimum investment level which 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 Debreu (1959, ch. 7), Jensen and Long (1972), Long (1972), Merton and Subrahmanyam (1974), Hirshleifer (1958, 1970), and Fama and Miller (1972).

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 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 fig. 2 portrays one possible path of the equilibrium levels of the owner's non-pecuniary 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 at that level of investment), and (2) the tangency occurs on the "budget constraint" with slope = -1 for the firm value and non-pecuniary benefit trade-off at the same level of investment.[24] As we move along *ZEDHL* his

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[24] Each equilibrium point such as that at *E* is characterized by $(\hat{a}, \hat{F}, \overset{c}{W}_t)$ where $\overset{c}{W}_t$ is the entrepreneur's post-investment financing wealth. Such an equilibrium must satisfy each of the following four conditions:

(1) $$\overset{c}{W}_t + F = \bar{V}(I) + W - I = \bar{V}(I) - K,$$

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) $$UF(\overset{c}{W}_t, \hat{F}) / UW_t(\overset{c}{W}_t, \hat{F}) = \hat{a},$$

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

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 non-pecuniary 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 which maximizes his welfare. At this point, the level of investments is *I'*, his fractional ownership share in the firm is α', his wealth is *W+V'-I'*, and he consumes a stream of non-pecuniary 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:

$$\Delta V - \Delta I + \alpha' \Delta F = 0 \quad (1)$$

$\Delta V - \Delta I$ 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 fringe benefits he consumes (which cost the firm ΔF dollars).[25] 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

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

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

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

[25] *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 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,

$$\Delta V - \Delta I / \Delta F = -\alpha' \quad (2)$$

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

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

The idealized or zero agency cost solution, I^*, is given by the condition $(\Delta\overline{V} - \Delta I) = 0$, and since F is positive the actual welfare maximizing level of investment I' will be less than I^*, because $(\Delta\overline{V} - \Delta I)$ must be positive at I' if (3) is to be satisfied. Since -α' is the slope of the indifference curve at the optimum and therefore represents the manager's demand price for incremental non-pecuniary benefits, F, we know that α' F is the dollar value to him of an increment of fringe benefits costing the firm F dollars. The term (1-α') F thus measures the dollar "loss" to the firm (and himself) of an additional F dollars spent on non-pecuniary benefits. The term $\Delta\overline{V} - \Delta I$ is the gross increment in the value of the firm ignoring any changes in the consumption of non-pecuniary 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.[26]

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

[26] 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 relationship 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 which lies on the maximum value budget constraint with intercept $\overline{V}(I^*) - I^*$, 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.

2.4 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 non-pecuniary benefits. These methods include auditing, formal control systems, budget restrictions, the establishment of incentive compensation systems which serve to identify the manager's interests more closely with those of the outside equity holders, and so forth. Fig. 3 portrays the effects of monitoring and other control activities in the simple situation portrayed in fig. 1. Figs. 1 and 3 are identical except for the curve *BCE* in fig. 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 non-pecuniary 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 reduce the value of any given claim on the firm to them dollar for dollar, the outside equity holders will take this into account in determining 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 fig. 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 which gives them the rights to restrict his consumption of non-pecuniary 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 outsiders, *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 non-pecuniary benefits he previously enjoyed.

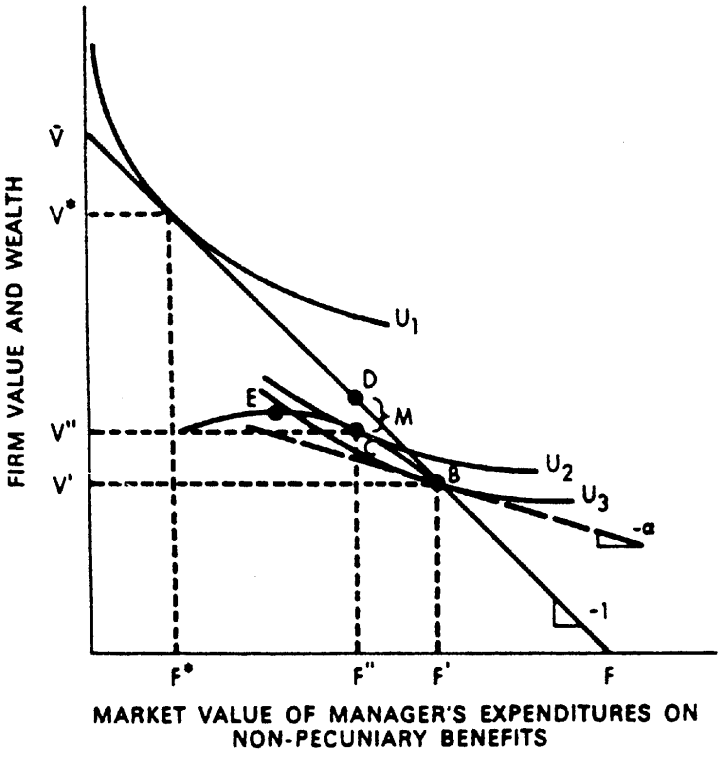

Fig. 3. The value of the firm *(V)* and level of non-pecuniary benefits *(F)* when outside equity is (1-α), U_1, U_2, U_3 represent owner's indifference curves between wealth and non-pecuniary benefits, and monitoring (or bonding) activities impose opportunity set *BCE* as the tradeoff constraint facing the owner.

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

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.

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 $D-C$ which will limit the owner-manager's consumption of perquisites to F''.

Given the 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.[27]

An analysis of bonding expenditures. We can also see from the analysis of fig. 3 that it makes no difference who actually makes the monitoring expenditures—the owner bears the full amount of these costs as a wealth reduction in all cases. Suppose that the owner-manager could expend resources to guarantee to the outside equity holders that he would limit his activities which

[27] The careful reader will note that point *C* will be the equilibrium point only if the contract between the manager and outside equity holders specifies with no ambiguity that they have the right to monitor to limit his consumption of perquisites to an amount no less than F''. If any ambiguity regarding these rights exists in this contract then another source of agency costs arises which is symmetrical to our original problem. If they could do so the outside equity holders 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 point where $(1-\alpha)V-M$ was at a maximum 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 which allowed monitoring.

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 account, explicit bonding against malfeasance on the part of the manager, and contractual limitations on the manager's decision-making power (which impose costs on the firm because they limit 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 the same opportunity set *BCE* for him in fig. 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 which 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 which allow monitoring as long as the marginal benefits of each are greater than their marginal cost.

Optimal scale of the firm in the presence of monitoring and bonding activities. If we allow the outside owners to engage in (costly) monitoring activities to limit the manager's expenditures on non-pecuniary benefits and 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 illustrated in fig. 4 on which *Z* and *G* lie. We have assumed in drawing fig. 4 that the cost functions involved in monitoring and bonding are such that some positive levels of the activities are desirable, i.e., yield benefits greater than their cost. If this is not true the expansion path generated 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 they lie on are identical to those portrayed in fig. 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 by the point labeled *C* in fig. 3 which denotes the optimal level of monitoring and bonding activity and resulting values of the firm and non-pecuniary 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 be above the non-monitoring expansion path over some range. 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 and/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 level of monitoring and bonding expenditures are *M"* and *b"*; the manager's post-investment-financing wealth is given by $W + V"-I"-M"-b"$ and his non-pecuniary benefits are *F"*. The total gross agency costs, *A*, are given by $A(M", b", \alpha", I") = (V^*-I^*) - (V"-I"-M"-b")$.

2.5 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, are 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 (1932) popularized 157 years later. 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.

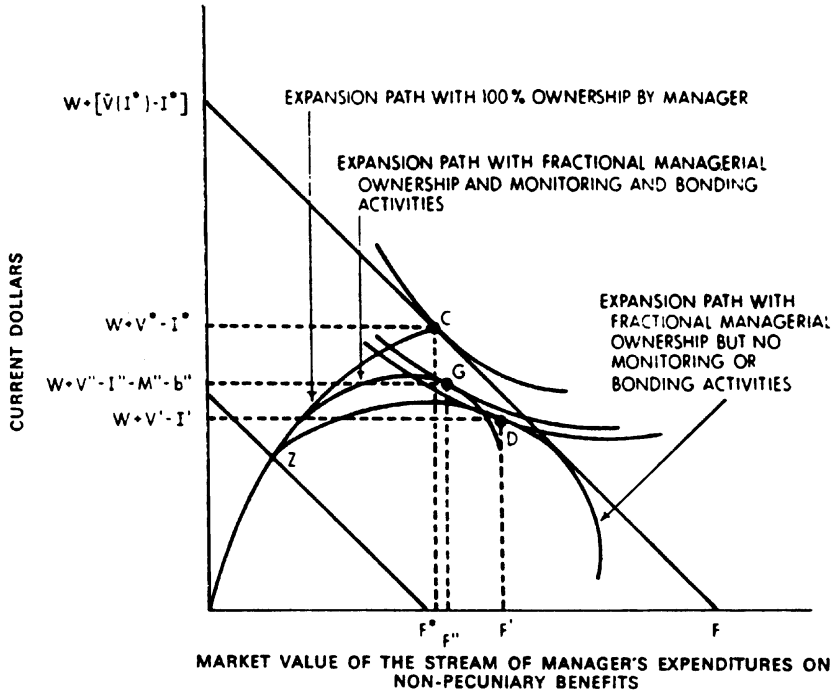

Fig. 4. Determination of optimal scale of the firm allowing for monitoring and bonding activities. Optimal monitoring costs are *M"* and bonding costs are *b"* and the equilibrium scale of firm, manager's wealth and consumption of non-pecuniary benefits are at point G.

The reduced value of the firm caused by the manager's consumption of perquisites outlined above is "non-optimal" 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). Furthermore, 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 non-zero (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 non-optimal, 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 costs, and concluding that the first world is "non-optimal"—a perfect example of the fallacy criticized by Coase (1964) and what Demsetz (1969) characterizes as the "Nirvana" form of analysis.[28]

2.6 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 as opposed to value maximization in decision making, and the costs of monitoring and bonding activities.[29] 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

[28] If we could establish the existence of a feasible set of alternative institutional arrangements which would yield net benefits from the reduction of these costs we could legitimately conclude 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.

[29] 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.

compensating the manager which 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, it 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 which 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, i.e., 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 including the capital value of the eliminated agency costs plus the value of the managerial rights.

Monopoly, competition and managerial behavior. It is frequently argued that the existence of competition in product (and factor) markets will constrain the behavior of managers to idealized value maximization, i.e., that monopoly in product (or monopsony in factor) markets

will permit larger divergences from value maximization.[30] 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 (cf. Friedman, 1970). If my competitors all incur agency costs equal to or greater than mine I will not be eliminated from the market by their competition.

The existence and size of the agency costs depends on the nature of the monitoring costs, the tastes of managers for non-pecuniary 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,

[30] 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 (Williamson, 1964, p. 2).

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.[31]

3. Some unanswered questions regarding the existence of the corporate form

3.1 The question

The analysis to this point has left us with a basic puzzle: Why, given the existence of positive costs of the agency relationship, do we find the usual corporate form of organization with widely diffuse ownership so widely prevalent? 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 (1968): 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, i.e., on the anticipation that managers will operate the firm so that there will be earnings which accrue to the stockholders?

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, i.e., through fixed claims of various sorts, bonds, notes, mortgages, etc. Moreover, the corporate income tax seems to favor the use of fixed claims since interest is treated as a tax deductible expense. Those who assert

[31] 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 which carry the family name, etc.

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?[32]

3.2 Some alternative explanations of the ownership structure of the firm

The role of limited liability. Manne (1967) and Alchian and Demsetz (1972) argue that one of the attractive features of the corporate form vis-à-vis individual proprietorships or partnerships is the limited liability feature of equity claims in corporations. Without this provision each and every investor purchasing one or more shares of a corporation would be potentially liable to the full extent of his personal wealth for the debts of the corporation. 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. This argument, however, is incomplete since limited liability does not eliminate the basic risk, it merely shifts it. The argument must rest ultimately on transaction costs. If all stockholders of GM were liable for GM's debts, the maximum liability for an individual shareholder would be greater than it would be 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. However, 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 the form of higher interest rates to the creditors of GM in return for their acceptance of a contract which grants limited liability to the

[32] Marris (1964, pp. 7-9) is the exception, although he argues that there exists some 'maximum leverage point'

shareholders. The creditors would then bear the risk of any non-payment of debts in the event of GM's bankruptcy.

It is also not generally recognized that limited liability is merely a necessary condition for explaining the magnitude of the reliance on equities, not a sufficient condition. Ordinary debt also carries limited liability.[33] 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.[34] 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.[35]) 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

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beyond which the chances of "insolvency" are in some undefined sense too high.

[33] By limited liability we mean the same conditions that apply to common stock. Subordinated debt or preferred stock could be constructed which carried with it liability provisions; i.e., if the corporation's assets were insufficient at some point to pay off all prior claims (such as trade credit, accrued wages, senior debt, etc.) and if the personal resources of the 'equity' holders 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 which might be limited or unlimited in amount).

[34] Alchian-Demsetz (1972, 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 to 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 on the distribution of outcomes on the equity which is exactly the same as that which the firm could issue. Similarly, investors could easily unlever any position by simply buying a proportional claim on 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 (1972, ch. 4) for an excellent exposition of these issues.

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

the particular forms we have 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 article on the cost of capital, Modigliani and Miller (1958) 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 (1963) 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. But this line of argument implies that the firm should be financed almost entirely with debt. Realizing the inconsistence with observed behavior, Modigliani and Miller (1963, p. 442) comment:

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.

Modigliani and Miller are essentially left without a theory of the determination of the optimal capital structure, and Fama and Miller (1972, p. 173) 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.

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, i.e., as the ratio of debt to equity rises. We believe the existence of agency costs provide 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 which defines an optimal capital structure,[36] 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 which have no tax advantages, and there is no theory which 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.

[36] See Kraus and Litzenberger (1973) and Lloyd-Davies (1975).

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.[37] This could be accomplished in principle 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 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 the diffuse-owner corporate firm financed by equity claims so prevalent as an organizational form.

An ingenious entrepreneur eager to expand, has open to him the opportunity to design a whole hierarchy of fixed claims on assets and earnings, with premiums paid for different levels of risk.[38] 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.

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[37] 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.

[38] The spectrum of claims which 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 non-callable. 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 of Arrow (1964b), Debreu (1959) and Hirshleifer (1970).

4.1 The Incentive Effects Associated with Debt

We don't find many large firms financed almost entirely with debt-type claims (i.e., non-residual claims) because of the effect such a financial structure would have on the owner-manager's behavior. Potential creditors will not loan $100,000,000 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) which promise very high payoffs if successful even if they have a very low probability of success. If they turn out well, he captures most of the gains, if they turn out badly, the creditors bear most of the costs.[39]

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, b_j, in the Sharpe (1964)-Lintner (1965) capital asset pricing model, is

[39] 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 (1972, pp. 179-180) also discuss and provide a numerical example of an investment decision which illustrates very nicely the potential inconsistency between the interests of bondholders and stockholders.

assumed to be identical. 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.[40]

However, if the owner 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 (naive) 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

$$R_j = X^*, \quad if \quad \tilde{X}_j \geq X^*,$$

$$= \tilde{X}_j, \quad if \; \tilde{X}_j \leq X^*.$$

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 bondholders 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 (1973) option pricing model to determine the

[40] The portfolio diversification issues facing the owner-manager are brought into the analysis in section 5 below.

values of the debt, B_j, and equity, S_j, under each of the choices.[41] Black-Scholes derive the solution for the value of a European call option (one which 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 leveraged 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 (1973, 1974) shows that as the variance of the outcome distribution rises the value of the stock (i.e., call option) rises, and 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 $B_1 = V\text{-}S_1$, and $B_2 = V\text{-}S_2$.

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.

[41] See Smith (1976) for a review of this option pricing literature and its applications and Galai and Masulis (1976) who apply the option pricing model to mergers, and corporate investment decisions.

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 V, which is given by

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

is sufficiently small relative to the reduction in the value of the bonds the value of the stock will increase.[42] Rearranging the expression for V we see that 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 first term on the RHS, $(B_1 - B_2)$, 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.[43] 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.

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[42] While we used the option pricing model above to motivate the discussion and provide some intuitive understanding of the incentives facing the equity holders, the option pricing solutions of Black and Scholes (1973) 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. Long (1974) points out this difficulty with respect to the usefulness of the model in the context of tax subsidies on interest and bankruptcy cost. The results of Merton (1974) and Galai and Masulis (1976) must be interpreted with care since the solutions are strictly incorrect in the context of tax subsidies and/or agency costs.

[43] The numerical example of Fama and Miller (1972, pp. 179-180) 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 equity holders 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.

In this simple example the reduced value of the firm, V_1-V_2, is the agency cost engendered by the issuance of debt[44] and it is borne by the owner-manager. 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 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 are monitoring and bonding costs and we now consider their role.

4.2 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 which results in reductions in the value of the bonds. Provisions which impose constraints on management's decisions regarding such things as dividends, future debt issues,[45] and maintenance of working capital are not uncommon in bond issues.[46] 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)

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[44] Myers (1975) points out another serious incentive effect on managerial decisions of the existence of debt which 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 which 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 equity holders. 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.

[45] Black-Scholes (1973) discuss ways in which dividend and future financing policy can redistribute wealth between classes of claimants on the firm.

would likely be non-trivial. 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 debt claim,[47] 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 which 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 he is already collecting much of the data they desire for his own internal decision-making purposes), it would

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[46] Black, Miller and Posner (1978) discuss many of these issues with particular reference to the government regulation of bank holding companies.

[47] 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 Benston (1977).

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.[48,49]

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[48] 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 $(V_1\text{-}b) > V_2$, or alternatively $(V_1\text{-}V_2) > b$ 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 which 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

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

The bondholders will realize that (i) represents in fact a claim on project 2 and that (ii) and (iii) represent a claim on project 1 and are thus 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 $m < b < V_1\text{-}V_2$, 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.

[49] We mention, without going into the problem in detail, that similar to the case in which the outside equity holders 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 which would transfer wealth from the equity holder to the bondholders (by taking sufficiently less risky projects). One can easily construct situations where such actions could make the bondholders better off, hurt the equity holders 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 which expressly reserves all rights not specifically granted to the bondholder for the equity holder), 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.'

4.3 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 and 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 liquidation 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,[50] 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,[51] 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, i.e., the sum of the values which 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 which clearly delineate the rights of holders for all possible contingencies. Thus even if there were no adverse incentive

[50] 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.

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 where 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 the claimants, simply go on (although perhaps under new management).[52]

In practice, bankruptcy is not costless, but generally involves an adjudication process which 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 "non-cooperative" 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 i.e., 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 equity holder will bear the

[51] We have been told that while this is true in principle, the actual behavior of the courts appears to frequently 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.

[52] If under bankruptcy the bondholders have the right to fire the management, the management will have some incentives to avoid taking actions which increase the probability of this event (even if it is in the best interest of the equity holders) 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.

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.[53]

Empirical studies of the magnitude of bankruptcy costs are almost non-existent. Warner (1977) in a study of 11 railroad bankruptcies between 1930 and 1955 estimates the average costs of bankruptcy[54] as a fraction of the value of the firm three years prior to bankruptcy to be 2.5% (with a range of 0.4% to 5.9%). The average dollar costs were $1.88 million. Both of these measures seem remarkably 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. (See Atkinson, 1967.) One possible explanation for this phenomena 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

[53] Kraus and Litzenberger (1973) and Lloyd-Davies (1975) demonstrate that the total value of the firm will be reduced by these costs.

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 principle and interest payments. Service facilities and spare parts for automobiles and machinery are other examples.

In summary then the agency costs associated with debt[55] consist of:

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.

4.4 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 he 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.)[56] Modigliani and Miller (1963) originally demonstrated

[54] These include only payments to all parties for legal fees, professional services, trustees' fees and filing fees. They do 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.

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 (1972, ch. 4) 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. Again, these gains will accrue entirely to the equity and will provide an incentive to utilize debt to the point where the marginal wealth benefits of the tax subsidy are just equal to the marginal wealth effects of the agency costs discussed above.

However, even in the absence of these tax benefits, debt would be utilized if the ability to exploit potentially profitable investment opportunities is 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 investments 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

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[55] Which, incidentally, exist only when the debt has some probability of default.

[56] 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 which 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 which are larger than that caused by debt (including the bankruptcy costs of debt). There are two reasons for this. First, the equity holder's 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.

be unique to this firm[57] or they would be taken by other competitive entrepreneurs (perhaps new ones) who possessed the requisite personal wealth to fully finance the projects[58] and 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 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:[59]

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).

[57] 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 which 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.

[58] 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% owners in this example.

[59] We continue to ignore such instruments as convertible bonds and warrants.

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 which determines the optimal size of the firm, i.e., its level of investment.

5.1 Determination of 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 we use as our index of size *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 which 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.

Fig. 5 presents a breakdown of the agency costs into two separate components: Define $A_{So}(E)$ as the total agency costs (a function of *E*) associated with the 'exploitation' of the outside equity holders by the owner-manager, and $A_B(E)$ as the total agency costs associated with the presence of debt in the ownership structure. $A_\tau(E) = A_{So}(E) + A_B(E)$ is the total agency cost.

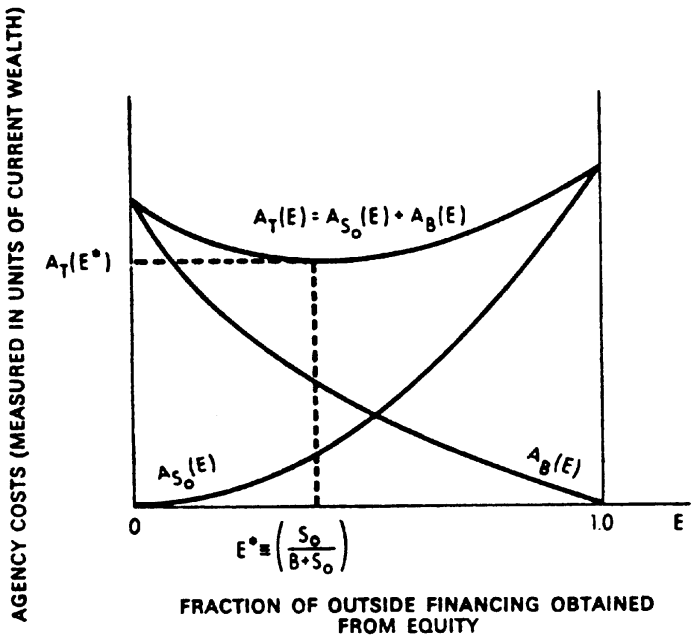

Fig. 5. Total agency costs, $A_\tau(E)$, as a function of the ratio of outside equity, to total outside financing, $E \equiv S_o/(B+S_o)$, for a given firm size V^* and given total amounts of outside financing $(B+S_o)$. $A_{So}(E) \equiv$ agency costs associated with outside equity. $A_B(E) \equiv$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

Consider the function $A_{So}(E)$. When $E \equiv S_o/(B+S_o)$ is zero, i.e., 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.[60] As E increases to 100 percent his incentives to exploit the outside equity holders increase and hence the agency costs $A_{So}(E)$ increase.

[60] Note, however, that even when outsiders own none of the equity the stockholder-manager still has some incentives to engage in activities which yield him non-pecuniary benefits but reduce the value of the firm by more than he personally values the benefits if there is any risky debt outstanding. Any such actions he takes which 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 the option pricing 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 $\partial S/\partial V$). Both of these terms are less than unity (cf. Black and Scholes, 1973). Therefore, any action of the manager which 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 non-pecuniary benefits.

The agency costs associated with the existence of debt, $A_B(E)$ are composed mainly of the value reductions in the firm and 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, i.e., where $S_o = E = 0$. 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, and (2) his share of any reallocation which is accomplished is falling since S_o is rising and therefore $S_i/(S_o+S_i)$, his share of the total equity, is falling.

The curve $A_\tau(E)$ represents the sum of the agency costs from various combinations of outside equity and debt financing, and as long as $A_{So}(E)$ and $A_B(E)$ are as we have drawn them the minimum total agency cost for given size firm and outside financing will occur at some point such as $A_\tau(E^*)$ with a mixture of both debt and equity.[61]

A caveat. Before proceeding further we point out that the issue regarding the exact shapes of the functions drawn in fig. 5 and several others discussed below is essentially an open question at this time. In the end the shape of these functions is a question of fact and can only be settled by empirical evidence. We outline some a priori arguments which 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

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

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 to 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.

5.2 Effects of the Scale of Outside Financing

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

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

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

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 non-pecuniary 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 $A_{So}(E;K)$ to shift upward as the fraction of outside financing, K, increases. This is depicted in fig. 6 by the two curves representing the agency costs of equity, one for the low level 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.

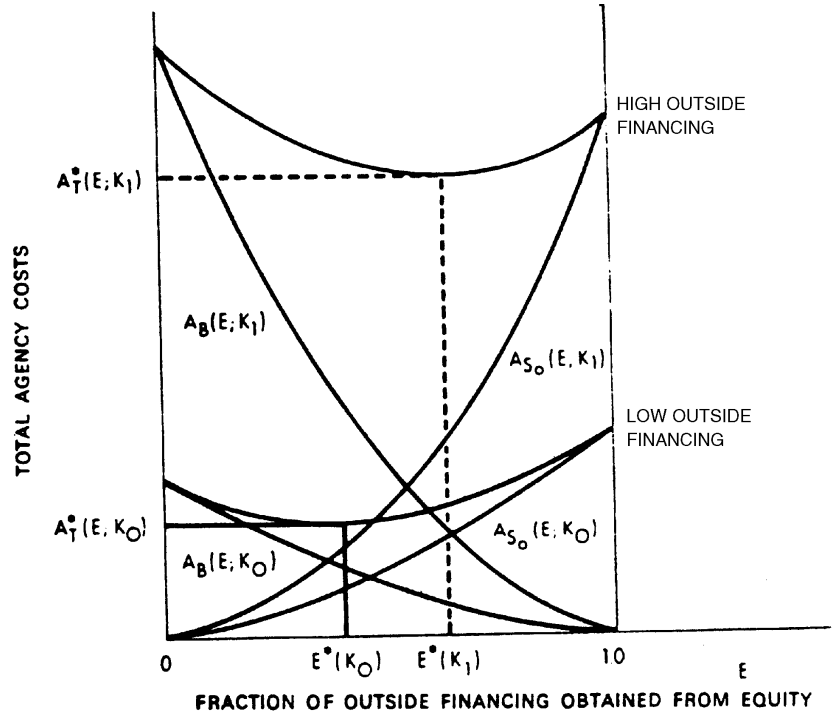

Fig. 6. Agency cost functions and optimal outside equity as a fraction of total outside financing, $E^*(K)$, for two different levels of outside financing. K, for a given size firm, $V^* : K_1 > K_o$.

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 which 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 fig. 6 is to: (1) increase the total agency costs from $A_\tau(E^*;K_o)$ to $A_\tau(E^*;K_1)$, 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)* which gives the general effects of increasing outside financing on the relative quantities of debt and equity.

The locus of points $A_\tau(E^*;K)$ 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 fig. 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_o^*. The dotted line shows the total agency costs for a larger firm with scale $V_1^* > V_o^*$. 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.

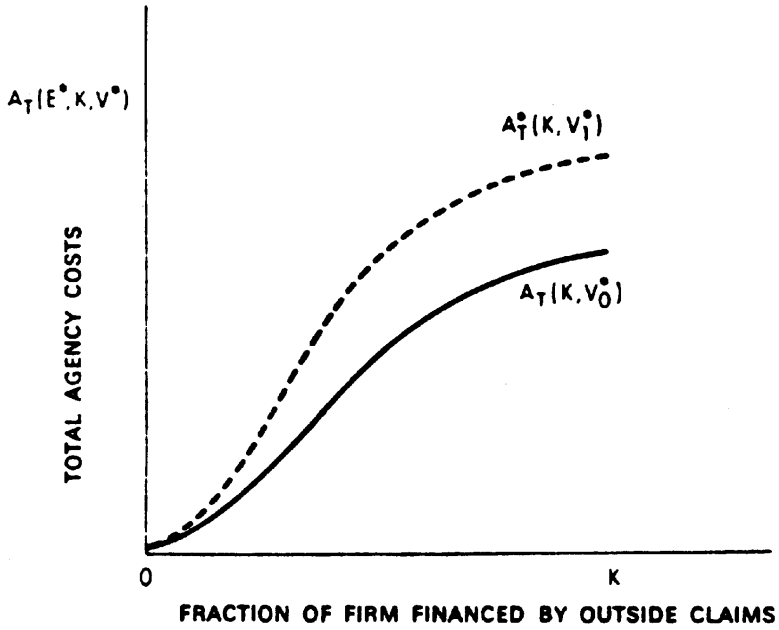

Fig. 7. Total agency costs as a function of the fraction of the firm financed by outside claims for two firm sizes, $V_1^* > V_o^*$.

5.3 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 which additional outside funding impose. This suggests he would not resort to outside funding until he had invested 100 percent of his personal wealth in the firm—an implication which 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.[62] 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, i.e., by diversifying.[63] 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.

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[62] On the average, however, top managers seem to have substantial holdings in absolute dollars. A recent survey by Wytmar (1974, p. 1) reported that the median value of 826 chief executive officers' stock holdings in their companies at year end 1973 and $557,000 and $1.3 million at year end 1972.

[63] These diversification effects can be substantial. Evans and Archer (1968) show that on the average for New York Stock Exchange securities approximately 55% of the total risk (as measured by standard deviation of portfolio returns) can be eliminated by following a naive strategy of dividing one's assets equally among 40 randomly selected securities.

5.4 Determination of 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 corporation is then determined by the condition that, $DV\text{-}DI = 0$. 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, $A_\tau(E^*,K;V^*)$ in fig. 7. The functions $A_\tau(E^*,K;V^*)$ 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 fig. 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 fig. 8. This curve represents the marginal value of the increased diversification which 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 fig. 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.

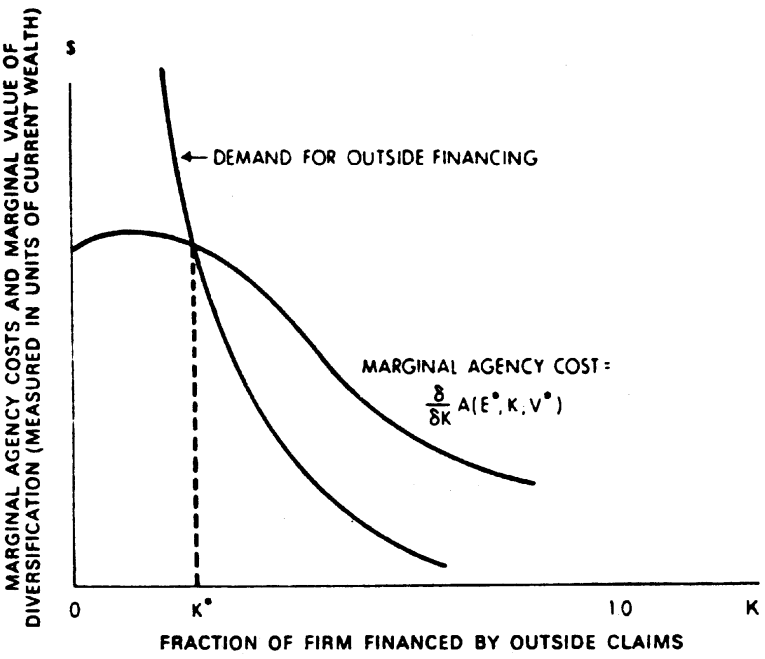

Fig. 8. Determination of the optimal amount of outside financing, *K**, for a given scale of firm.

5.5 Determination of 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 of the solution is analogous to the case where 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 fig. 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

6.1 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 which might arise after the initial set of contracts are consummated between the entrepreneur–manager, outside stockholders and bondholders. These are important issues which are left for future analysis.[64] 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 which 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 unfavorably influence 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.[65] Furthermore, it will generally be impossible for him to fully guarantee the outside interests that his successor will continue to follow his policies.

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[64] The recent work of Myers (1975) 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.

[65] Becker and Stigler (1972) analyze 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.

6.2 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 concerned about the effects on his long–run welfare of reducing his fractional ownership below the point where he loses effective control of the corporation. That is, below the point where it becomes possible for the outside equity holders 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.

6.3 A Note on the Existence of Inside Debt and Some Conjectures on the Use of Convertible Financial Instruments

We have been asked[66] why debt held by the manager (i.e., "inside debt") plays no role in our analysis. We have as yet been unable to incorporate this dimension formally into our analysis in a satisfactory way. The question is a good one and suggests some potentially important

[66] By our colleague David Henderson.

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 debt holders to the stockholders. Consider the case where

$$B_i/S_i = B_o/S_o, \qquad (4)$$

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 debt held by outsiders. In this case, if the manager changes the investment policy of the firm to reallocate wealth between the debt and equity holders, 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.[67]

Why then don't we observe practices or formal contracts which 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 this 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.[68] 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

[67] This also suggests that *some* outside debt holders 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 debt holders, 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.

[68] Consider the situation 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.

understanding of the relationship between formal debt holdings and the wage contract; i.e., 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

$$B_i/S_i \Rightarrow B_o/S_o.$$

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 debt holders 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 in a risk–averse way to the detriment of the equity holders. 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. Warrants, convertible bonds, and convertible preferred stock have some of the characteristics of non–voting shares although they can be converted into voting shares under some terms. Alchian–Demsetz (1972) provide an interesting analysis regarding the use of non–voting shares. They argue that some shareholders with strong beliefs in the talents and 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 non–voting shares by listed firms, the use of the option–type 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 non–detachable warrants. It seems that the incentive effect 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 part of the proceeds associated with a shift in the distribution of returns with the warrant holders. 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 to transfer wealth from bondholders. It would also then be attractive to the owner–manager because of the reduction in the agency costs which 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 therefore 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 in cases where the incentive effects of such fixed claims are high than when they are low.

6.4 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 which 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. One of the groups who seem to play a large role in these activities is composed of the security analysts employed by institutional investors, brokers and investment

advisory services as well as the analysis performed by individual investors in the normal course of investment decision making.

A large body of evidence exists which indicates that security prices incorporate in an unbiased manner all publicly available information and much of what might be called "private information".[69] There is also a large body of evidence which indicates that the security analysis activities of mutual funds and other institutional investors are not reflected in portfolio returns, i.e., they do not increase risk–adjusted portfolio returns over a naive random selection buy–and–hold strategy.[70] Therefore, some have been tempted to conclude that the resources expended on such research activities to find under– or over–valued securities is a social loss. Jensen (1979) argues that this conclusion cannot be unambiguously drawn because there is a large consumption element in the demand for these services.

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 the security analysis activity 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,[71] 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 non–optimal amount

[69] See Fama (1970a) for a survey of this 'efficient markets' literature.

[70] See Jensen (1969) for an example of this evidence and references.

[71] Ignoring any pure consumption elements in the demand for security analysis

of security analysis being performed, it is too much[72] 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.

6.5 Specialization in the Use of Debt and Equity

Our previous analysis of agency costs suggests at least one other testable hypothesis: i.e., that in those industries where the incentive effects of outside equity or debt are widely different, we would expect to see specialization in the use of the low agency cost financing arrangement. In industries where 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, ease of 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 the opposite would be true where 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) should be characterized by relatively lower utilization of debt. Conversely, in industries where 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

[72] Again ignoring the value of the pure consumption elements in the demand for security analysis.

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.

6.6 Application of the Analysis to the Large Diffuse Ownership Corporation

While we believe the structure outlined in the proceeding 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 is that, as it stands, 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.

6.7 The Supply Side of the Incomplete Markets Question

The analysis of this paper is also relevant to the incomplete market issue considered by Arrow (1964a), Diamond (1967), Hakansson (1974a, 1974b), Rubinstein (1974), Ross (1974b), and others. 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 (see Arrow, 1964a, andDebreu, 1959) the resulting allocation is Pareto inefficient. A disturbing element in this literature surrounds the fact that the 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 an analysis of the supply of markets issue which is founded in 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 will be very fruitful instead of implicitly assuming that new claims spring forth from some (costless) well head of creativity unaided or unsupported by human effort.

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 which 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 suggests 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.

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