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ABSTRACT

While bankers and businessmen have long recognized the importance of finance, financial constraints, and financial institutions, they have played a secondary role in neoclassical economic theory. This paper identifies the economic functions with which financial institutions have been concerned, the central problems which they face, and the alternative ways by which those problems can and have been addressed. The importance of limited liability and the legal environment is stressed. The final section explores the relationship between information-based finance constraints, the evolution of the firm, and the growth of the economy.

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Information, Finance, and Markets: The Architecture of Allocative Mechanisms

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Bankers and businessmen have long recognized the importance of finance, financial constraints, and financial institutions for the vitality and growth, both of their enterprises and of the economy. Yet, while these financial factors may have played a central role in economic theories of the nineteenth and early twentieth centuries (see, e.g. Hawtrey [1919]), for almost a half century they have been subordinated to a secondary role by economic theorists. In seeking to explain business cycles, the most recent fad among American academic economists--real business cycles--attributes no role at all to financial institutions; while in the earlier new classical

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theories (and even much of Keynesian theory[2]) all financial analysis is subsumed under the control of the money supply.

In looking at macro-economic theories of long term growth, this narrowing of theoretical vision has been, if anything, even more extreme. Neoclassical growth theory ignored the role of financing institutions altogether (e.g., Solow [1956]) and the few attempts to look at the role of financial markets (e.g., Foley and Sidrauski [1970]) focused narrowly on the effects of money supply decisions. In our view, while the former perspective is simply wrong, the latter approach not only represents a vast oversimplication, but it is a misleading one: the prescriptions which emerge, both with respect to micro- and macro- policy, are, at best partial,

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[2]Keynes must be given part of the blame for these developments: his aggregation of long term bonds and equities ignored the fundamental differences between these two forms of capital, differences which play a central role in explaining business fluctuations.

If Keynes set the economics profession on the wrong road, Modigliani and Miller--appearing a quarter century after the publication of Keynes' General Theory--provided the intellectual underpinnings for what was by then standard practice among macro-economists. They provided a set of assumptions under which financial structure truly made no difference. While for almost fifteen years following Modigliani and Miller, the profession sought to show that their result was more general than even they had realized (see, e.g. Hirshleifer [1966], and Stiglitz [1969, 1972a]), it has only been in the past fifteen years that we have gradually come to understand why the theorem is of little relevance. (See, e.g. Stiglitz [1988a] and the references cited there.)

The econometric work examining firm behavior, particularly with respect to investment behavior, provides an important cautionary tale: while the earlier work of Kyh and Meyer [1959] had provided strong suggestions that, at least for many firms, financial factors were important in determining their investment behavior, the later work of Jorgenson and his co-authors (see, e.g. Hall and Jorgenson [1967]) employing the so-called neoclassical theory of investment excluded these variables, simply because they (wrongly) believed that "economic theory" argued that they should have been excluded. While "measurement without theory" may not be the best approach to understanding economic systems, and while it may be true that "data can never speak for themselves," we should at least listen to the strong whispers of the data, and not be over confident in our theories, particularly when they contradict common sense.

at worst, suspect. Thus, it is significant that in empirical economic analyses (e.g., in development economics and economic history) there is extensive debate on the role of financial institutions in stimulating growth which is almost invisible in the theoretical arena.

This paper is divided into three sections. The first defines the economic problems with which the financial institutions are concerned. It argues that the central function of financial institutions is to overcome, or at least deal with, the information problems which, in their absence, would impede the agglomeration of capital and its transfer from those who have resources to those who can most effectively use it. The second shows the variety of ways with which modern economies address these problems, identifying the strengths and weaknesses of the alternative mechanisms, discusses briefly how these institutions have evolved, and identifies the legal and technological changes that were required for the development of these financial institutions. The third section explores the relationship between the financial constraints which arise out of the informational imperfections and the evolution of the firm. It serves to illustrate the impact of financial institutions on real resource allocations, and to suggest why neoclassical models, which systematically ignored financial institutions and constraints, may be seriously misleading.

I

THE ROLE OF FINANCIAL INSTITUTIONS

There are two reasons for the development of financial institutions[3]: some enterprises require more capital than any single individual has at his disposal (the agglomeration function); and those who are in the best position to invest (to innovate, to monitor, etc.) are not necessarily those who have resources (the transfer function.[4])[5]

To accomplish these functions, financial institutions must select among alternative uses of those funds (the selection function), and they seek to encourage prudent behavior on the part of those to whom they have provided funds, to ensure that the funds are used in a way which will reap the providers of the fund the expected return, both by designing contractual (implicit and explicit) arrangements and by direct monitoring (the control function).[6]

It is important to realize, at this juncture, the basic differences between financial (capital) markets and other markets, in which goods are

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[3] There are other reasons, with which we shall be less concerned in this paper; principal among these is risk diversification.

[4] Indeed, in the natural life cycle of a firm, in the early stages the firm needs more capital than it generates, while in later stages it may generate more profits than it can profitably invest.

[5] The adduced reasons for financial institutions are really reasons either for the existence of a capital market or for financial institutions. Below, we explain why credit markets are not like auction markets, that is, why financial institutions are required.

[6] Both the selection (or screening) function and the control function can be thought of as information problems: imperfect information is an impediment to the functioning of financial markets, and it is a principal objective of financial institutions to overcome these informational impediments.

traded contemporaneously. In capital markets, money today is exchanged for a promise of returns in the future. The promise is always, in effect, a contingent promise: in the case of a bond, the promise takes the form, "I will pay a certain amount, provided that I can; and if I can't, certain other consequences follow...." In the case of equity, the promise takes the form, "I will pay a fraction of my profits. I will decide the fraction, and I will decide how profits are defined. Trust me! If I don't pay you a dividend, I will reinvest the money in the firm, and you will receive a return in the form of a capital gain."

It is precisely this difference which explains why financial markets are not, and cannot be, run as auction markets; why lenders, for instance, do not simply lend to those who are willing to offer to pay the highest interest rates. Those who promise to pay the highest interest rates may not, in fact, be those for whom the expected return is highest.[7]

Banks and other financial institutions are in the business of directly allocating resources, of making judgments about the best uses of capital, or at least, about which users are most likely to pay the promised returns. Prices (interest rates) play a role in the allocative mechanism--they define, for instance, the opportunity cost of the funds; but the allocative mechanism is fundamentally a screening mechanism, in which prices play a secondary role. Thus, in contrast to markets for homogeneous commodities, in which the role of institutions (firms and market makers) can reasonably be approximated by the interaction of supply and demand, in studying

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[7]This point has been emphasized by Stiglitz and Weiss (1981) and Stiglitz (1988b).

financial markets and the allocation of funds, the role of institutions is central.

A Simple Formal Model

Consider a simple situation in which an agent (entrepreneur or manager) offers participation in a project to investors. The amount to be raised is V. Without these funds no project may be undertaken. Assume that the project is completed after a fixed period and there is a return, π, which is available for distribution to both investors and the agent. This return depends on the amount of funds actually committed to the project, k, which may be either greater or less than V depending on whether the agent himself makes a positive or negative investment; on the underlying attractiveness of the project, θ, and on the actions taken by the agent, e, which include not only active management of the project and effort expended, but also the steps that the agent takes to appropriate the benefits of the project for himself.[8] Formally,

(I.1) $$\pi = h(k,e,\theta) \ , \ h_k>0, \ h_e>0, \ h_\theta>0$$

The return to investors, R, depends upon the way in which the total return, π, is divided. For simplicity we will assume that a fraction, α, is paid out to investors. Thus,

(I.2) $$R = \alpha\pi = \alpha h \ (k,e,\theta)$$

In practice, π is neither observable nor known with certainty at the time funds are raised. Moreover, it may be only imperfectly observable by the time the project terminates. The level of investment, k, may also not be observed ex ante and may be observable only imperfectly and at high cost

[8] From this perspective, greater efforts expended to divert funds from the firm to the manager represent smaller values of e.

ex post. The same applies to the actions of the agent, e, and the attractiveness of the project. They will be difficult to observe both before and after the fact. Finally, while α may be specified ex ante, in many contracts (e.g., payment of corporate dividends) it is not.[9]

The central problems of financial management, in this context, are (1) how to determine an appropriate level of V (and the form in which V is raised) given the imperfect nature of information concerning all the determinants of R (these decisions affect both the beliefs of investors concerning what they might expect and the incentives of the agents), and (2) how to monitor and/or control (directly or indirectly, completely, or more likely, partially) the variables θ, k and e so that appropriate decisions in the interests of the investors are made.

Impediments to the Development of Financial Markets

Given the importance ascribed to financial markets and institutions in modern economies, it is perhaps remarkable that they have developed so late. Though antecedents of modern capital markets have, of course, existed for a long time, the scale of modern institutions and the range of financial instruments which they offer are truly unprecedented.

Yet, upon further reflection, the natural impediments to the development of financial markets are stupendous, and we should, perhaps, be impressed that they work as well as they do.

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[9]Moreover, α may itself be a function of other variables. The relationship between R and π will, of course, differ for different financial instruments.

Recent research has identified five central problems facing financial markets, which are related to the functions of financial intermediaries about which we spoke earlier. These problems arise, in varying forms and in varying degrees, with essentially all financial instruments used to raise capital. In some cases, they may arise with such force as to make it virtually impossible to raise capital in the open market, or to use certain instruments (such as equity.)

(a) The selection problem. The fundamental problem facing capital markets can be put starkly: there is an infinite supply of charlatans in the market, those who are willing to take others' money for their own uses. Moreover, like the students in our courses, all of whom believe that they are in the upper half of the class, even honest entrepreneurs are likely to have an inflated view of the returns to their projects. And there is little reason to believe that the correlation between individuals' beliefs in their returns and the actual returns are sufficiently high (even if we could solicit honest views concerning what those expected returns are) to warrant allocating scarce funds on the basis of those expectations.

In terms of the model outlined above, the existence of an almost infinitely elastic supply of charlatans means that at $V > 0$ there is a very large supply of projects at which $R \leq 0$ either (a) because $k = 0$ and/or (b) levels of e are chosen which make π either zero or, if access to credit is available in some form, less than zero[10] or (c) there was no real project opportunity so that $\pi = 0$, given θ, for all k and e, or (d) because, after the fact, the unobservable true level of π, while positive, is reported to

[10] In this interpretation, π is profits after paying off debtors.

be zero by the agent. In any of these cases, there are a number of projects, N, which are indistinguishable from "valid" projects, for which the return $R^N \leq 0$. If we denote the returns of similar seeming legitimate projects as R^L and there are a fixed number L of these, the average return to projects offered investors is

$$\bar{R} = \left[\frac{N}{N + L}\right] R^N + \left[\frac{L}{N + L}\right] R^L \tag{I.3}$$

Investors will in the long run only make continuing investments if

$$V(1 + \rho) < \bar{R} \tag{I.4}$$

where ρ is an appropriate required expected rate of return encompassing both the time value of funds and returns for risk. Since $L.R^L$ is fixed, determined by the available technologies and resources, for any $V > 0$, there is an N large enough and a R^N small enough so that $\bar{R} < (1 + \rho)\, V$. Thus, no financial markets consistently capable of raising positive funds will exist unless there are some limitations on N and R^N.

We have perhaps put the matter too strongly in ascribing the selection problem to the infinite supply of charlatans and dreamers. The problem is actually more generic: it arises whenever there are asymmetries of information between providers of capital and those seeking capital concerning the returns to projects. For instance, insiders (the firm managers and controlling shareholders) almost inevitably have more information concerning the firm's prospects than outsiders. They are most keen to sell the shares of their enterprise when the market has overvalued them. When the market has undervalued them, they are obviously reluctant to

sell their shares. The market recognizes this, and there is considerable evidence that, in the absence of other information to the contrary, the market interprets a firm's willingness to issue shares as a negative signal concerning its quality; that is, the price of shares falls dramatically upon (the announcement of) a share issue. Of course, firms are aware of this, and this explains, in part, the relatively little reliance on new share issues. Indeed, in the absence of risk aversion, it can be shown that there would be no market for equities.[11] (But of course, in the absence of risk aversion, the adverse risk bearing effects which are associated with the use of debt rather than equity finance would not be present.)[12]

Finally, we should emphasize that the selection problem arises even when there is no asymmetry of information, and where borrowers are not intentionally cheating lenders. If there is a large supply of individuals who are overconfident of their abilities, investors have a problem of screening the unproductive investments from the truly productive investments. They cannot simply rely on the price system as a selection device.

While the selection problem arises in both credit and equity markets, the scope that equity contracts provide for charlatans makes these contracts extremely attractive to them, and makes the selection problem central there.

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[11] These issues have been discussed at greater length by Greenwald, Stiglitz, and Weiss (1984) and Myers and Majluf (1984).

[12] There remain adverse incentive and selection effects. See, e.g. Stiglitz and Weiss [1981].

(b) The enforcement problem. The equity contract is supposed to pay equity holders a fraction of the firm's profits. But typically, the contract leaves the fraction of the profits to be paid, as well as the definition of profits, to the discretion of the firm's managers (board of directors). The scope for diversion of funds to the use of managers or controlling shareholders appears to be great.

Indeed, even in the case of income bonds (where firms promise to pay a certain amount to bondholders out of the firm's income, provided that there is sufficient income), firms have manipulated the definition of income in a way to evade paying amounts due, so much so that currently income bonds are seldom used, in spite of their risk sharing advantages to corporations.[13]

Formally, we have

(I.5) $\quad R = \alpha\hat{\pi}$

where $\hat{\pi}$ is the declared profit level. $\hat{\pi}$ may be substantially less than π.[14]

In this subsection, we have actually identified two separate

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[13]Gale and Hellwig (1985) and the recent literature on sovereign debt (Eaton and Gersovitz [1981], Eaton, Gersovitz, and Stiglitz [1986]) has emphasized the enforcement problem.

A recent literature (under the rubric of "costly state verification")(Townsend [1979]) has developed, arguing that enforcement costs (or more precisely, the costs of the required verification) are less with debt than equity contracts. Providers of capital only have to verify the state of nature if the borrower fails to make the promised payment. As am explanation of the use of debt rather than equity, the theory has been criticized both on the grounds that the costs of verification do not appear to be that significant (the other explanations accordingly seem more persuasive); more importantly, <u>given</u> that there are outstanding equities, for which, in the simple models at least, state verification is required, there are no <u>marginal</u> verification costs associated with issuing additional equities.

As we noted above, the cost of verifying income/profits were an impediment to the early development of equity markets, and remain an impediment to the use of income bonds.

[14]This corresponds to point (d) made in the discussion preceding equation (I.3).

enforcement problems: (i) the difficulty of verifying the state of nature, or the variables upon which the payments to the supplier of funds are supposed to depend; and (ii) the difficulty of making the receiver of the funds comply with the terms of the contract. The latter problem is the one that the literature on sovereign debt has focused, but the fact that there are large legal costs in enforcing a contract make it apparent that this problem may be more pervasive. Indeed, the fact that in bankruptcy, owners of equity typically walk away with something, even though debt claimants do not have their claims fully satisfied is evidence to the importance of these enforcement problems.

(c) The incentive problem. Since firms' managers reap only a fraction of the returns to their managerial efforts, their incentives are attenuated (Stiglitz (1974a), Jensen and Meckling (1976), Ross (1973)). More generally, the interests of the managers do not coincide with the interests of the shareholders. This has been made dramatically clear in recent take-over controversies.[15] These discrepancies affect a whole range of decisions.

(d) The Management/Public Good Problem. Since, in principle, all shareholders receive the same amount per share, any efforts by a shareholder (or group of shareholders) to improve the quality of management (the return

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[15]Hannaway (1989) has emphasized the range of activities over which discrepancies in interests may arise. Information which may be of limited value to the firm may be of considerable value to the individual, in, for instance, signalling to others his competency and command of the situation.

Shleifer and Vishny (1988) have, similarly, stressed managers' incentives for making themselves indispensable to the firm, thus increasing the amount that they can extract from the firm (managerial entrenchment.)

to their shares) redounds to the benefit of all shareholders. (The same is true for any other class of claimants.) Therefore, Management and efforts to improve Management are Public Goods.[16] Thus, in corporations with widely held shares, the forces driving managers to serve shareholder interests may be particularly weak.

(e) The Conflicting Claims Problem. While the interests of all claimants within a class (shareholders, bondholders) coincide[17], the interests of different classes of claimants frequently conflict. This too was seen most dramatically in several of the recent LBO's (Leverage Buy-outs) within the U.S., where the value of debtors' claims decreased dramatically as the value of equity claims increased.[18] While debt contracts show a cognizance of this possibility, with provisions which restrict the actions which the firm can undertake, the debt contract can seldom anticipate all the actions which the firm might undertake which would decrease the value of their claims. While future debt contracts are likely to provide some insurance against losses arising from LBOs, firms will, undoubtedly, devise new methods of transferring wealth from other claimants on the firm to themselves.

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[16]This point has been emphasized by Alchian and Demsetz (1972), Grossman and Hart (1980), and Stiglitz (1982, 1985).

[17]Except, of course, to the extent that controlling shareholders can divert some of the firms' assets to their own interests.

[18]The potential for this has long been recognized in the theoretical literature. See, for instance, Stiglitz (1972a).

Difficulties Facing Equity Issues:

An Application of General Principles

In terms of the model developed above, when equity issues are undertaken as part of the continuing financing efforts of a long-lived firm whose common stock is publicly traded, the population of investors/shareholders changes continuously over time. Thus, there is no longer a well-identified investor population associated with a particular investment project whose interests the project's managers can be required, at least in theory, to serve. This, in turn, calls into question the definition of appropriate behavior of a project's managers, since decisions which benefit shareholders at time, t, may adversely affect the interests of shareholders at a later time, t + 1.[19][20] The common answer to these difficulties both in law and economic theory is to assume that in making decisions at time t, managers serve the interest of current shareholders (i.e. those who hold stock at time t).[21] For simplicity we will assume that there are only two periods of interest. In the first, the managers of the firm make a set of financing decisions, the market price of the firm's equity is determined on an open market in response to those decisions (a

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[19]And in the absence of perfect information, later shareholders may not be able to protect themselves by reducing their willingness to invest.

[20]Only in special cases, such as where there is a complete set of state-contingent securities, will there be no ambiguity about what the firm should do. See Stiglitz (1974b, 1972a, 1972b) or Grossman and Stiglitz (1977, 1980).

[21]It should be apparent, however, that only under severe restrictions will this policy, of maximizing the current market value, or expected utility of current owners, be (constrained) Pareto efficient. See, e.g. Stiglitz (1972b).

reaction anticipated by the firm's managers), funds are raised and operating plans are undertaken. In the second period, the results of the initial operating and investment decisions are revealed and returns to investors are determined accordingly. In addition, we will assume that a fraction β of the initial shares are sold by shareholders after financing decisions are announced in period one (and, therefore, a fraction $1 - \beta$ are retained through period two).[22] Formally, therefore, the proper objective function for such a firm's managers is to maximize

$$\beta V_0 + (1 - \beta)\Gamma\alpha\hat{\pi} - c(k)\text{Prob}(\pi \leq R^*) \tag{I.6}$$

where V_0 is the initial post-financing-decision market value of the firm, Γ is the fraction of the firm held by its initial shareholders (this is one if no new equity is sold), R^* now represents the promised level of repayment on the firm's debts, $\hat{\pi}$ is declared profit, c is now the penalty associated with bankruptcy, and we now assume that bankruptcy penalties involving the reorganization of the firm now increase with the size of the firm. If an amount of new equity, E, is raised in the financing period, then

$$\Gamma = \left(\frac{V_0}{V_0 + E} \right) . \tag{I.7}$$

Assume further that a firm's managers have their own agenda to which they respond at least partially, reflected in their utility function, which we represent as a function of θ, the nature of the project, k, and the resources devoted to the project, effort. For clarity, we distinguish between "e," the effort devoted to increasing π, and $\hat{e}$, the effort devoted to underreporting, which we model as simply a function of the discrepancy

[22]The standard theoretical justification for such an assumption is that of an overlapping generations model in which most wealth is held by older investors who sell it off for consumption goods over time.

between π and $\hat{\pi}$, for any project. Thus, we represent the managers' utility function by $\hat{u}(e,\theta,k,\hat{e}(\pi - \hat{\pi}, \theta,k))$, where $\hat{u}$ embeds within it the managerial compensation schemes which define the financial rewards received by the manager. It will be convenient in the following discussion if we simply represent the managers' utility in terms of the variables e, θ, k, and $\hat{\pi}$:

(I.8) $$u(e,\theta,k,\hat{\pi}) = \hat{u}(e,\theta,k,\hat{e}(\pi - \hat{\pi}, \theta,k)).$$

Then what actually is maximized reflects to some extent the managers' own utility:

(I.8) $$\beta V_0 + (1 - \beta)\Gamma\alpha\hat{\pi} - c(k)\ \text{Prob}(\pi \leq R^*) + \Psi u$$

and this is maximized, as before, subject to the constraint that

(I.9) $$\hat{\pi} \leq \pi(e,k,\theta).$$

Ψ represents the weight the manager places on his own agenda (utility). (The conventional principal agent literature assumes that Ψ is infinite, that is, the manager simply maximizes his own expected utility, given the incentive schemes he faces.[23])

This model can be used to illustrate several of the impediments to equity markets to which we referred earlier:

(a) The conflicting claims are reflected in difference in judgments

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[23]We suspect that that formulation exaggerates the extent to which employees in general follow self-interested policies. There appear to be many instances where individuals "do their job" --and do it well--not simply because their financial rewards increase the better they perform. (This holds even if we take into account the increased likelihood of promotion for good behavior, and the increased likelihood of dismissal for poor performance.) This is particularly true in managerial jobs where it may be little more difficult to do a good job than a poor job, and individuals receive considerable satisfaction from doing a good job. The fact that their company is number one, or that they have done better than their rivals, is satisfaction enough.

concerning the weights to be associated with current market value versus future profitability, the parameter β above.[24]

(b) As holding periods of shareholders become extremely short, β tends towards one, and only the initial value, V_0, matters to managers. This, in turn, means that signals become overwhelmingly important relative to actual performance and, like financial markets without fraud sanctions (see the discussion below), equity markets will tend to collapse completely.[25]

(c) The managerial incentive problem--the conflict between managers' incentives and that of the "firm" (whatever β is employed)-- is reflected in the term

$$u(e,\theta,k,\ \hat{e}(\pi - \hat{\pi},\ \theta,k))$$

which, we noted, is assumed to have imbedded in it the managerial incentive compensation scheme. It is generally not possible to find managerial compensation schemes (with risk averse managers) so that when they maximize their "utility," shareholder welfare (for any β) is maximized.

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[24]This only reflects conflicting claims among shareholders, not the conflicts between shareholders and bondholders.

[25]The proof of this claim follows from a straightforward comparative statics analysis of the Greenwald-Stiglitz-Weiss (1984) model.

II.

COMING TO TERMS WITH CAPITAL MARKETS IMPEDIMENTS: THE ARCHITECTURE OF ALLOCATIVE MECHANISMS

In spite of these seeming impediments to the transfer and agglomeration of capital, capital is transferred and agglomerated. This is one of the hallmarks of modern capitalism. We thus need to ask, how do modern economies overcome these impediments? What were the changes in the legal, economic, and social structure which facilitated the development of modern equities markets, and which enabled these markets to overcome the significant barriers to the effective functioning of these markets?

Trust

Historically, in the absence of a well functioning legal system, there are two mechanisms which have worked to ensure the fulfillment of contracts: trust and reputation.

Trust played an important role in the early development of capital markets, in which financial transactions were often concentrated among members of a well defined ethnic group or community. In such a context, social sanctions were a more effective instrument for the enforcement of contracts than economic sanctions.[26] (The fact that transactions occurred within a relatively small group also mitigated the information problem: the participants in the transactions likely had considerable information about each other.) It is, perhaps, ironic that the development of capitalist financial institutions depended, to a large extent, on non-capitalist ethics

[26]The recent literature on sovereign debt has made clear the limited effectiveness of economic sanctions. See, for instance, Eaton, Gersovitz, and Stiglitz (1986).

and control mechanisms, a point to which we shall return later.[27] But as economic development proceeded, the increasing scale of enterprise made it impossible to limit raising and transferring funds within the members of a close knit community. Moreover, in some cases, social bonds within the community weakened, reducing the force of social sanctions as a discipline device.

Reputation

For reputation to be effective, there must be a continuing flow of profits: otherwise there would be no incentive to maintain one's reputation. Reputations provide an effective barrier to entry, which may allow the profits to be sustained. Again, we note an irony: the viability of capitalist financial institutions depends on limitations on the degree of competition.[28] The flow of profits associated with banks, which surely rank among the most important of the financial intermediaries, arose, in most countries, from governmentally imposed restrictions on entry combined with the rights to print money (fractional reserve banking.) The profits generated by these government granted monopolies depended, in part, on the assets which were available in which reserves could be held. The fact that in England, government debt provided a relatively safe investment opportunity yielding a positive return gave British banks the flow of profits, which not only provided depositors with some direct insurance of the safety of their funds, but also provided banks with an incentive to

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[27]Albert Hirschman has stressed a similar point in some of his recent writings.

[28]The limitations on competition are endogenous, rather than exogenous, and in equilibrium, though existing firms earn positive profits, there are zero profits associated with entry. See, e.g. Stiglitz (1986).

maintain their reputation, an incentive which reduced the likelihood that the funds would be invested in an excessively risky manner. In this view then, the stability of the British government's national debt was closely linked with the successful development of some of its financial institutions.

However, for reputation to be an effective incentive for those who raise equity to pay a return to their investors, the firm must have plans to have recourse once again to the equity market. But such future recourse to the equity market may have disadvantages as well: for it may imply dilution of the original owners' equity claims. Furthermore, each return to the equity market is a negative signal, with adverse effects on the firms' market value. (See Gale-Stiglitz, 1989). If it is not the desire for future access to the equity market which provides the firm with an incentive to pay a return to equity owners, what does? It is the legal strictures, which require that all shareholders (controlling and non-controlling) be treated the same, and the limitations imposed by the legal system in the ability of controlling shareholders to divert funds to their own interests.[28]

Changes in Legal Structure

Trust and reputation, while they may have sufficed for simpler capital markets, by themselves were not sufficient for the development of effective,

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[28]Two other mechanisms are often suggested as imposing discipline on managers: (a) shareholder voting and (b) take-overs. There are good theoretical reasons for suspecting that these mechanisms are of only limited efficacy (see Stiglitz [1982, 1985], Grossman and Hart [1980]) and observation of firm behavior seems consistent with this view.

widespread financial markets. For this, two innovations in the legal structure were required.

First, the principle of limited liability had to be recognized. Without limited liability, the costs that charlatans could impose on investors would be unlimited and investors would be unwilling to turn over funds to others about whom they had very limited information, even if those others contained only a relatively small fraction of charlatans.

Once limited liability constraints are imposed so that $R^N \geq 0$, then the average return to investors is bounded below by

$$\bar{R} \geq \left\{ \frac{L \cdot R^L}{N + L} \right\}$$

which may be small if N is very large relative to L, but which nevertheless provides the possibility of $V \geq 0$. Historically, of course, limited liability has always been characteristic of debt contracts. The lender is not held responsible for the uses to which his money has been put. At worst, he loses his money. Hence, the early existence of borrowing and lending. However, in order to provide for the risk-spreading opportunities inherent in equity markets, explicit limited liability laws for equity investors are essential. Unfortunately, limited liability by itself would still, given an extensive supply of charlatans, create only limited opportunities for raising financial resources, since investors would pay only small levels of V for projects.

Secondly, a legal system which could effectively prosecute securities

fraud[30] was required. Without such a system, the ability of firm managers to divert resources is essentially unfettered, and again, the costs of not knowing the honesty of the managers (or of not monitoring borrowers' activities) would effectively deter most investment. As it is, even with fraud statutes, the scope for managerial diversion of funds for their own benefits (as recent episodes of managerial behavior in the face of take-over bids testifies) is not insignificant.

Again, this condition can be expressed in terms of our simple model. The actual levels of θ, e, k and, where π is unobservable, the declared level of π, are determined by the objective function of a project's agent. Thus, in the polar case where he maximizes his own utility, his behavior is defined by the problem[31]

$$\max_{e,k} u\ (e,\ k,\ \hat{\pi},\ \theta)$$

where $\hat{\pi}$ is the declared level of profit and θ enters the agent's decision whether or not to bring a particular project to market. We have hitherto assumed essentially that u_e, u_k, and $u_{\tilde{\pi}}$ are all less than zero (hence the tendency to strip the project's owners of any possible return). However, once mechanisms for prosecuting fraud are in place, the agent's objective function may now be specified in an entirely different way. A contract may be written between investors and their agent which merely specifies a promised return, R*, on any given project. If "fraud" is interpreted as the

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[30] As will be apparent from our discussion below, we are using the term, fraud, in a very broad sense.

[31] Identical results obtain if he maximizes the more general objective function (I.8).

payment of a penalty in the event of failure to deliver on such a promise, then the objective function of the agent becomes

$$\max_{e,k} u(e,k,\hat{\pi},\theta) - \hat{c} \text{ Prob } (\alpha\hat{\pi} \leq R^*)$$

where $\hat{c}$ is the cost of "fraud," Prob $(\alpha\hat{\pi} \leq R^*)$ is the probability of being (found) guilty of fraud and, of course, this problem must now be solved subject to the constraint that

$$\alpha\hat{\pi} = \hat{R} \leq \pi(e,k,\theta)$$

since declared "dividends" must actually be paid. As $\hat{c}$, the penalty for fraud, becomes very large, agents will (1) always declare a value of "profits" sufficient to provide the promised rate of return, where this is feasible; (2) take actions, e, and make investments, k, which ensure that promised returns, R*, can feasibly be paid and (3) avoid undertaking projects where θ is such that condition (2) cannot be fulfilled with high probability.

Fraud penalties thus not only deal directly with the "enforcement" problem; they also have incentive effects. Furthermore, they may enhance the ability of good firms to signal that fact; when there is a fraud penalty, promises ("R*") convey information; better firms will, in general, promise more.[32] Moreover, fraud penalties deter charlatans from entering the market. Thus, fraud penalties also enhance the economy's ability to solve the selection problem.

If effective fraud enforcement is interpreted to mean a level of c

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[32]Certain technical conditions have to be satisfied for this to be the case.

sufficiently high to ensure that promises are normally fulfilled, it will imply that

$$\bar{R} \approx R^*$$

for the project universe as a whole and, with diversification, that

$$V = \bar{R}/(1 + \rho)$$

is substantially positive. Historically institutions, like debtors prisons, have developed to serve precisely these fraud policing functions.

However, while such fraud control mechanisms may be essential to the functioning of financial markets they create a new set of financing problems in solving old ones. Typically, the returns to investment projects are uncertain even to the agents who undertake and manage them. Thus, as the cost of fraud, c, increases it not only deters fraudulent investors, but also deters legitimate projects. The chance of incurring fraud costs accidentally may either (a) limit the scope of projects, or (b) lead to serious underestimates of promised returns (and, hence, underfinancing) or (c) deter the undertakings altogether. This is especially likely if agents are risk averse. As a result, the vigorous fraud control approach described above must be tempered either (1) by limiting penalties and/or (2) by developing approaches for excusing fraudulent performance under circumstances beyond the agent's control and/or (3) by providing financing without explicit return promises (i.e. equity finance). Yet these tempered measures, which might be thought of as constituting an imperfect legal control system, reintroduce the original problems posed by the agent's private knowledge of e, π and k.

The Modern Corporation

The development of the large, modern corporation was, to a large extent, made possible by the improvements in financial markets, and at the same time represented an intrinsic part of those improvements. We want to call attention to four aspects of these developments.

First, while the development of accounting practices and auditing procedures made the internal control of the firm feasible, it also enabled investors to monitor more effectively what was going on within the firm. These accounting standards made it possible to define fraud more precisely and to detect it more easily. In the context of the model, audit and punishment systems could be applied to reduce deviations between $\hat{\pi}$ and π and deviations of e, k and θ from desirable levels.

Secondly, the large scale firm could make use of systems of peer monitoring to reduce the likelihood of fraud. In a small firm, the owner/manager could doctor the books, with little scrutiny from anyone else. In a large scale firm, with multiple checks, fraud (diversion of funds meant for the common interests of shareholders in general to the interests of a few) required the complicity of a large number of individuals, making such diversion less likely.

At the same time, the modern corporation created an "internal capital market." Funds could be transferred around the country, allocated to regions and used where returns were highest. The firms created a community to replace the ethnic communities, in which members knew each other well, and while social sanctions may be limited, economic sanctions (being fired,

denied promotion within the hierarchy) could be quite effective.[33] (Indeed, in recent years, it has been very much the fad to speak of the culture of a corporation.) In most cases within the United States, the corporation developed a specialized knowledge associated with certain markets (products). As a result, while capital was efficiently allocated within certain spheres, large discrepancies might arise between returns in different markets. But the informational and other problems discussed above provided an important barrier to the flow of funds. (Chandler has rightly emphasized the importance of the lowering of transportation costs to the development of national markets. The national markets in the US were sufficiently large that diseconomies of scope set in when firms attempted to cross into new markets. The emergence of conglomerates provides a possible exception--yet the failure of so many of the conglomerates suggests that these diseconomies were considerable, outweighing the obvious gains from arbitraging across markets.)

Finally, corporations facilitate the functioning of the reputation mechanism. Firms create an asset called good will, based on the firm's reputation, and it pays current owners to maintain that asset.[34] This, in turn, implies that investors may be more willing to provide long-established corporations with funds. In effect, the firm's incentive to maintain its reputation reduces the investors' monitoring costs.[35] [36]

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[33]The circumstances under which these are effective incentive devices are explored in Stiglitz and Weiss (1983).

[34]See Eaton (1986).

[35]Stiglitz and Weiss (1983) show that the intertemporal interlinking of loans (making the availability of funds at one date dependent on the firm's performance at an earlier date) increases banks' expected returns.

Venture Capital

Modern corporations as mechanisms for allocating capital face two problems. The first, which we have just discussed, is their specialization within an industry. The second is specialization in certain competencies relevant to the operation of large well-defined continuing enterprises with extensive but fragmented authority delegated to individuals or groups of individuals. Both of these specializations may render corporations particularly unsuited to operate in nascent markets where success depends on familiarity with new technologies and demand behaviors on the one hand and specific characteristics (e.g., imagination, risk preference) on the other hand which are not prevalent in large modern corporations. Accordingly, a disproportionate amount of innovation arises in new and small enterprises. The problems we discussed earlier concerning the functioning of capital markets arise forcefully, and cannot be resolved through the institution of the modern corporation. To fill this gap, special institutions have grown up in the United States which constitute the venture capital industry.[37]

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[36] At the same time, it needs to be recognized that the information costs which give the modern corporation a role in allocating capital also give rise to considerable managerial discretion. While capital may be more efficiently allocated, some of the efficiency gains are appropriated by the managers, with the providers of capital reaping only a part of the returns. While the mechanisms described in this paper may limit the fraction of the returns which can be so appropriated, the total amount which managers can obtain in a large corporation may be enormous.

[37] The relatively small scale of most European markets in the period of the initial growth of most large corporations may account for the fact that European corporations have tended to be less highly specialized than US corporations and, hence, have themselves substituted to a greater extent for the venture capital industry in the United States.

The industry itself has many of the aspects of early financial market developments. Venture firms typically operate in a tightly-knit community, sharing projects among members of that community and engaging, by design, in a continuing stream of projects. As a result, reputation is critical to the effectiveness of the venture capital firms themselves and strong cultural ties bind these firms together with investors. At the same time, the entrepreneurs who are funded by the venture capital firms are closely tied to and highly dependent upon the venture capital firms. Consequently, venture capital firms tend to have detailed information on the operations of the projects they fund, and potentially strong sanctions in the event of misfeasance. The venture capital firms usually also have detailed specialized knowledge of the industries in which their entrepreneurs operate so that they are adept at evaluating relative entrepreneurial performance. The similarities to early capitalist communities appear to be striking.[38]

Further Impediments to Efficient Capital Markets

We began this paper with a list of problems which all financial markets face, and proceeded to show how certain changes in the economic and legal environment had facilitated the development of financial markets. We now want to raise some questions about how some more recent developments may, in the near future, serve to impede the functioning of capital markets.

First, we spoke earlier about the ability of corporations' managers to divert resources to their own purposes, and the role of the legal system in

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[38] See Sahlman (1989) for a detailed description of the venture capital industry in the United States.

preventing fraud. Belatedly, managers have discovered that there is a wide range of legal ways by which funds can be diverted to their purposes. In one recent take-over, the old managers walked off with $100 million. To make matters worse, in several states, the legal system has reinforced the rights of managers, and have made take-overs more difficult. Take-overs are one of the mechanisms by which shareholders can ensure (or make it more likely) that their assets are well managed, and that the market reflects accurately the true value of those assets.

Secondly, the improvements in the secondary market for equities have lead to an increase in short term trading of securities. Moreover, an increasingly large fraction of funds on the market originate in pension funds, managed by fiduciary agents, many of whom are judged by the short run performance of their portfolio. In short, the problems of which Keynes wrote more than a half-century ago, where investors focus on short term returns rather than the long term, are far more important today than they were when he was writing.

The consequences of this focus on the short term have been discussed extensively elsewhere. Here, we note one additional effect: the focus on the short term increases the signaling costs associated with issuing equities, and hence results in fewer firms issuing equity.[39] [40]

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[39]Greenwald, Stiglitz, and Weiss (1984) characterize the equilibrium size of the new equities market for any given β. This result is obtained by examining how the equilibrium changes as β changes.

[40]Summers and Summers (1989) and Stiglitz (1989) argue that an appropriately designed turnover tax may be used to encourage longer term holdings of equities.

III

FINANCE AND THE EVOLUTION OF THE FIRM

The neoclassical theory of the economy pictures capital as a liquid: it flows smoothly throughout the economy, until the rates of return in all sectors are the same. The picture we have drawn is markedly different: the problems (largely informational in character) which we have described above create large barriers to the free flow of capital. Capital inside the firm is different from capital outside the firm. As a result, there may be large differences in the observed rates of return across firms or sectors of the economy.

Why aren't the normal forces of arbitrage effective in overcoming the differences? Our analysis has provided at least a partial answer to this question: what we observe are <u>average</u> rates of return, say within a sector. Those outside the sector may be less able to select good projects within the sector, so their expected marginal returns may be much lower; and outside suppliers of funds may fear that (for any of the reasons delineated earlier) they may not be able to obtain the same rates of return on, say, new issues of equity.

But why don't existing firms borrow additional funds? First, firms may not be willing to borrow more, given the limited issue of equity, for to do so would expose them to additional risk, which they cannot divest. This is the fundamental difference between debt and equity: while debt entails a fixed obligation, equity does not; hence with debt, there is always a chance of bankruptcy. (See Greenwald and Stiglitz [1988, 1990]).

Secondly, lenders may not be willing to lend: with asymmetric information, moral hazard, and enforcement problems, credit markets will, in general, be characterized by credit rationing. (See Stiglitz and Weiss, 1981, 1983, 1986, 1987). Lenders are not concerned with the marginal return to investment, only with the fraction of the total returns which they can appropriate. The total return in one sector may be higher than in another, but the (expected) fraction which they can appropriate may be lower. Credit markets will not serve to equate (expected) returns to investments.

Of course, industries with high returns will have an incentive to reinvest a large fraction of their high profits back into the enterprise, and this reinvestment will eventually drive down the rate of return. Thus, there is a tendency for returns to capital to be equated in the long run, but the mechanism by which this occurs is quite different from that envisaged by the traditional neoclassical model. Moreover--and more importantly--new industries are constantly being created. Returns in these new industries may, accordingly, be significantly higher than in older, established industries, so that observed inequalities in rates of return may be persistent (though which industries are enjoying above normal rates of return may be always changing.)

Kalecki (1939), Kaldor (1956) and Robinson (1956) (and perhaps Marx and Rosa Luxembourg) postulated models in which investment by firms was tied to their profits. In these models, the main source of investment funds was firms' retained earnings.[41] For several decades, these models have been criticized for being "ad hoc"--whether they are realistic is quite another

[41]In this view, then, Kaldor's formulation of the aggregate savings function may provide a better description of the economy than Passinetti's formulation (1962).

matter. The advances in the theory of financial markets described in this paper have provided micro-foundations for the kinds of constraints on financial markets which underlay these models. The assumptions concerning information and contract enforcement are undoubtedly more reasonable than the assumptions of costless and perfect contract enforcement and perfect (or at least symmetric) information underlying the neoclassical model.

We now show how these ideas can be used to develop simple models of the evolution of firms. To begin with, we assume that there is equity and credit rationing: firms must rely on retained earnings to finance their investment. For simplicity, we assume that the output-capital ratio is fixed at b, and the labor-capital ratio is fixed at 1. K_i denotes the capital of the ith firm, and w the wage rate. Assume that the firm retains and invests a fraction s of its profits. Then

(III.1) $dK_i/dt = sbK_i - swlK_i$,

or

(III.2) $d\ln K_i/dt = m(w) = s(b - wl)$.

We thus obtain Gibrat's law: firms grow proportionately.

Assume the labor force grows at a fixed rate n, and that the rate of change of real wages is a function of the unemployment rate (a real Phillips curve.) Let aggregate capital be denoted by K:

(III.3) $K = \Sigma K_i$.

Aggregate employment is then

(III.4) $L = lK$.

The employment rate is then

(III.5) $lK/N = e$

where N is the aggregate labor supply. The real Phillips curve postulates that

(III.6) $d\ln w/dt = g(e) = g(1k), \quad g'>0$

where $k = K/N$.

In steady state,

(III.7) $g(e^*) = 0$,

or

(III.8) $K^* = Ne^*/l$

Summing the firm capital accumulation equations over all firms,

(III.9) $dK/dt = d\Sigma K_i/dt = \Sigma K_i m(w) - m(w)\Sigma K_i - m(w)K$,

or

(III.10) $d \ln k/dt = m(w) - n$.

In long run equilibrium, this implies that

(III.11) $d \ln K/dt = m(w) = n$,

or

(III.12) $w^* = m^{-1}(n) = sb - n/ls$.

Thus, in the long run wages adjust so that employment and capital grows exactly at the rate as the labor supply. It is easy to verify that the dynamics described by the differential equations III.6 and III.10 give rise to limit cycles.[42]

The model we have just described is completely non-stochastic. If we postulate that there are some diseconomies of scale (if we think of the number of firms in the economy as fixed at N, firms that are much larger

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[42]The aggregate equations are of the form of the Volterra-Lotka equations. See Akerlof and Stiglitz (1969). In the case where b is a function of the capital employment ratio (and hence of w), there is convergence to the steady state, but the path of convergence may entail oscillations.

than average are slightly less productive than smaller firms) and that there is some randomness in the accumulation process, then

(III.13) $d\ln K_i/dt = M(w,K_i/K)\epsilon_i$, with $E\epsilon = 1$.

Define $v_i = K_i/K$, so, in long run equilibrium with $d\ln K/dt = n$,[43]

(III.14) $d\ln v_i/dt = \hat{M}(w,v_i)\epsilon_i - n$.

The discrete time analogue to III.14 is a stochastic process which, it can easily be verified, satisfies all of the Champernowne conditions. There exists a steady state distribution of (relative) firm sizes, in which the tail of the distribution satisfies (approximately) Pareto's law.[44]

Extension to firms which are equity but not credit constrained. The analysis can be extended in a straightforward manner to firms which are equity but not credit constrained. For simplicity, we use the Greenwald-Stiglitz (1988) model in which costs of bankruptcy give rise to risk averse behavior on the part of firms; and these costs of bankruptcy are proportional to the scale of the firm. In that model, while firms can borrow as much as they wish at the actuarially fair interest rate (which takes into account in an appropriate manner the probability of default), because increased borrowing gives rise to an increased probability of default, firms choose to limit their borrowing. They show that firms will have an equilibrium debt equity ratio, d*. Thus, if their working capital

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[43] In effect, we are assuming that there are enough different firms that the law of large numbers allows us to ignore, at the aggregate level, the variations in ϵ, and that the economies/diseconomies of scale are sufficiently weak that the slight fluctuations in the distribution of K_i/K can also be ignored (i.e. we assume that $\sum M(w,K_i/K)K_i\epsilon_i \approx m(w)K$.)

[44] See Champernowne (1953) or Stiglitz (1969).

or equity is denoted by E, their debt is d*E, and their total capital is (1+d*)E. The change in the expected equity of the firm is then given by

(III.15) $dE_i/dt = b(1 + d^*)E - \rho d^*E - w\,l(1+d^*)E_i = \mu(\rho,w)E_i$.

where ρ is the safe rate of interest. It is clear that III.15 is exactly of the same form as III.2: our new model also gives rise to Gibrat's law. It should also be clear that other specifications of firm risk aversion (bankruptcy costs) and/or technologies can give rise to equations describing the evolution of the firm of the form

(III.16) $d\ln E_i/dt = \hat{\mu}(\rho,w,E_i)$.

To complete the model, we need to determine ρ. If we postulate that households have a savings function of the form

(III.17) $S = s(\rho,w)Y$,

where Y is household income, $wlK + \rho\, d^*E$, where E is aggregate equity,

$$E = \Sigma E_i$$

and K is the aggregate capital stock,

$$K = (1 + d^*(\rho,w))E$$

then in equilibrium, household savings must be equal to the increase in firm debt:

(III.18) $d^*(\rho,w)dE/dt = d^*(\rho,w)E\mu(\rho,w) = s(\rho,w)Y$

The steady state is determined by the pair of equations

(III.19) $d^*(\rho,w)\mu(w,\rho) = s(wl(1 + d^*) + \rho\, d^*)$

and

(III.20) $\mu(\rho,w) = n$.

Substituting III.20 into III.19, we obtain

(III.21) $d^*\{n - s\,\rho - swl\} = swl$

Normally, we would expect $\mu_1 < 0$ (increasing the rate of interest reduces the rate of equity accumulation) and $\mu_2 < 0$ (increasing the wage rate reduces the rate of equity accumulation.) Similarly $d_1 < 0$ (increasing the rate of interest that has to be paid on debt reduces the optimal debt equity ratio) and $d_2 < 0$ (increasing the wage rate, which reduces the profitability of output, makes production less attractive, and hence reduces the desired amount of borrowing.) Accordingly, so long as the savings rate does not decrease too rapidly as ρ increases (it seems unlikely) and so long as the savings rate does not decrease too rapidly as wages increase (which also seems unlikely), both III.20 and III.21 are positively sloped curves. It appears that there can be multiple steady states: a low wage, low interest rate equilibrium in which firms have a high debt equity ratio; and a high wage, higher interest rate equilibrium in which firms have a low debt equity ratio. In both equilibria, the steady state employment rate and per capita output are the same. The distribution of income and the economy's financial structures differ across equilibria. In a more general version of this model, in which the capital output ratio may differ, then the different equilibria will be associated with different levels of per capita income.

It is easy to extend this model to incorporate stochastic elements, as well as exogenously or endogenously determined changes in the rates of productivity growth, whether arising from learning by doing or investment in R & D. (See Greenwald and Stiglitz, 1990) In the latter case, differences in financial structure will be associated with different patterns of investment (differences in willingness to take risks): economic equilibria in which there is a low debt equity ratio will be associated with higher rates of investment in R & D, and accordingly higher rates of technological

progress. The formal development of these models will, however, take us beyond the scope of this paper.

The main points of this exploration would, moreover, be largely unaltered by these final extensions. These main points are that modern theories of financial market imperfections (chiefly related to informational problems) (a) provide effective theoretical support for much of the existing less theoretical literature on the role and importance of financial institutions and (b) serve to rehabilitate many of the early growth models and the conclusions concerning economic development that arose out of the earlier informal literature.

CONCLUSIONS

There are a few simple messages underlying the analysis of this paper:

1. Capital markets are different from other markets. They entail exchanges of money today for a promise of a return in the future. Ensuring that those promises can and will be fulfilled is a major concern of financial markets.

2. Difficulties in ensuring contract fulfillment presented a barrier to the development of modern financial markets. (In the text, we noted five major impediments to the development of financial markets.) Legal changes--the development of limited liability and enforceable fraud standards--combined with technological/economic advances (e. g. in accountancy and auditing) facilitated, and in some cases, were necessary for the development of modern capital markets.

3. Still, there remains a tension: the observed financial contracts may differ markedly from those that would arise in a world in which the problems we alluded to earlier did not arise. For instance, the functions of risk sharing would be well served by equity contracts; yet equity contracts suffer greatly from information asymmetry problems, as well as enforcement difficulties, so that relatively little reliance is placed on equity as a source of new finance.

4. These limitations on financial markets mean that financial markets function markedly differently from the way envisaged in traditional neoclassical theory. Rates of return across sectors may differ. The firm takes on a role as an important financial institution.

5. At the same time, these limitations, and the associated disparities in rates of return, give rise to two concomitant pressures: There is, first the pressure for financial innovations. Leveraged buy-outs and junk bonds represent two recent examples of these financial innovations in the United States. At the same time, there will always be those who will seek to take advantage of existing and new contract forms for their own advantage, to define the boundaries of the fraud statutes, and to exploit common perceptions of contract interpretations, and the limitations of trust and reputation as contract enforcement mechanisms. Golden parachutes and a variety of other forms of managerial entrenchment in the United States are but two recent examples.[45]

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[45]The evolutionary nature of the market--and the fact that learning in this environment appears, in one sense, quite rapid, and in other sense, quite limited--is illustrated by the S & L debacle in the United States.

The process is best described as an evolutionary one, in which the deficiencies in the market give rise to new contract forms, in which some of those in the market gradually learn how to exploit the new contract forms, and in which the market gradually learns the deficiencies in those forms, giving rise, in turn to still new arrangements. We suspect, for instance, that the true risks associated with the junk bond, a financial form lying between the standard bond and an equity, will only be fully recognized as the economy enters its next recession.[46] [47] Since the behavior and function of firms is so closely linked with finance, with the contractual arrangements by which it raises funds, this evolution of financial instruments will be intertwined with the evolution of the firm. And since the behavior and evolution of the economy as a whole depends on the behavior and evolution of the firms which comprise it, understanding the growth and development of modern industrial societies must begin by a study of the history and evolution of financial markets: This is the task before us in

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The S & L's were quick to respond to the new economic situation that they found themselves in in the 1980s, but they seemed not to have learned from history the risks associated with having too large a fraction of one's portfolio in correlated assets, nor did they grasp the possibility that prices of real estate may fall dramatically. The S & L crisis has also made it clear that the line between fraud and "moral hazard" may be a fine one. The crises has forced changes in financial regulations, which in turn will give rise to adaptations of the financial institutions.

Whether mortgage insurance and the development of national mortgage markets represent permanent changes in financial structure, or the temporary (mal-)adaptation of markets to a situation in which, for several decades, real estate markets have had relative stability--the problems of the Great Depression receding into ancient history--only time will tell.

[46]Though the junk bond itself may be partially a response to legal changes which reduced the economic costs of bankruptcy.

[47]See, for instance, Asquith and Mullins (forthcoming).

this conference. We hope our paper has provided a helpful conceptual framework with which to undertake this task.

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