The Buck Stops Where? The Role of Limited Liability in Economics

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If you come to grief, and creditors are craving
(for nothing planned by mortal head is certain in this
Vale of Sorrow—saving that one's liability is limited),
do you suppose that signifies perdition?
If so, you're but a monetary dunce;
you merely file a winding-up petition,
and start another company at once!
—Gilbert and Sullivan, *Utopia Limited*

LIABILITY, OR THE LACK THEREOF, HAS LONG PLAYED AN INTERESTING ROLE IN THE FIELDS OF ECONOMICS, FINANCE, AND LAW. FROM EARLY TIMES SOCIETIES HAVE DEBATED WHEN TO SHARE LOSSES ARISING FROM BAD ECONOMIC OUTCOMES, WHETHER THESE OUTCOMES ARE DUE TO BAD DECISIONS ON THE PART OF INDIVIDUALS, EVENTS INDEPENDENT OF INDIVIDUAL ACTIONS, OR SOME COMBINATION OF THE TWO.

In modern societies personal limited liability is the norm, given such conditions as finite wealth and the elimination of debtors' prisons. In fact, over the last few centuries, many societies have taken this principle further by passing laws that allow investors in banks and other business enterprises to limit their losses to either their initial investment (pure corporate limited liability) or some multiple of their initial capital contribution. This latter liability structure might call for an additional infusion of funds on the part of investors up to some maximum (say, two times the investment) should an enterprise fail to meet its obligations from available resources. Bank shareholders, for example, were once routinely required to post at least some additional funds in the event of a bank failure. This practice ceased only after the substitution of public capital, in the form of government deposit insurance, for the private capital formerly used to support the system.[1] Overall, changes in liability provisions, by many accounts, have been among the major influences on both the level and distribution of contemporary economic output as well as the allocation of financial resources in today's financial markets.

This article reviews a large and growing literature on the role of personal and corporate limited liability in the economy. As early as Adam Smith's ([1776] 1994) criticism of the emerging joint stock corporations of the eigh-

teenth century and Walter Bagehot's ([1873] 1991) analysis of the reasons for and consequences of the incorporation of the Bank of England in the seventeenth century, economists have been aware that liability structures, almost by definition, influence decisions made by households, businesses, and government agencies. This review attempts to provide a more thorough understanding of incentive structures under alternative liability regimes and, in doing so, should help policymakers better understand the possibly unintended effects of certain policies and programs.

Workers, investors, managers, and policymakers confront limited liability considerations every day. It is therefore useful to look at examples that cover the import of limited liability on activities ranging from investment, labor, and financing decisions made by individuals and corporations to the implementation of discretionary government policies that are intended to promote growth or redistribution of wealth in the economy. This examination begins with an illustration of some conflicts that may arise in labor markets because of certain rights, such as personal limited liability, held by providers of human capital, or the fact that the floor of zero wealth generally associated with personal limited liability may not be sufficient to sustain productive work. Next is a discussion of how liability rules influence the incentives of debtors and creditors at the level of individual corporations and of how liability structures are important in the investment and financing decisions of managers, acting as agents for shareholders. An outline of the role of limited liability in the relationship between government and private institutions as it relates to economic growth and the provision of liquidity to the banking system rounds out the article.

Labor Contracting, Limited Liability, and Subsistence Levels

Potential problems arise in labor contracting when individuals have limited liability and cannot be forced to work. Another factor to consider with regard to labor contracting is that the "real" lower bound for labor income might not be zero but some positive subsistence level.

Limited Liability and the Inalienability of Human Capital. Limited liability, combined with other basic rights, can provide those who supply labor an incentive to "hold up" the owners of a firm. Consider, for example, an individual whose only wealth exists in the form of human capital, in particular an idea that may generate future cash flows if he or she expends the required labor input. This "entrepreneur" might choose to sell the right to future cash flows generated by this idea to individuals with current wealth. Since the price of a security represents the present value of potential future cash flows, an "idea person" needed to make an ongoing contribution may well have an incentive to attempt to negotiate an additional share of future output after starting a project even after having sold the rights to all future cash flows at the outset. Leverage in such a situation is based on the facts that a person cannot be forced to work and that he or she possesses limited liability.[2] Furthermore, any threat by disgruntled shareholders to confiscate assets may be met with a "take the money and run" response on the part of the entrepreneur.[3]

Changes in liability provisions have been among the major influences on both the level and distribution of contemporary economic output as well as the allocation of financial resources in today's financial markets.

Hart and Moore (1994) and Noe and Smith (1994) argue that these problems can to some extent be mitigated by simply arranging financial transactions that do not transfer the total value of a project to an idea person immediately. This arrangement seriously blunts entrepreneurs' incentives to hold up other claimants for a larger share of output. If the amount held back is large enough, the negative incentive effects of "no-forced" work and limited liability can be eliminated. In other words, investors can solve a potential hold-up problem by holding up the transfer of part of the value of a project to the entrepreneur. This idea is very much in the spirit of venture capital arrangements and certain relationships with builders, whereby compensation is passed along in a piecemeal fashion, conditional on the completion of certain measurable outcomes. Such a "carrot-and-stick" approach can be used to induce "good" behavior. In fact, in some cases a simple labor contract—whereby an entrepreneur is paid a fixed wage immediately and, conditional on performance, a fixed wage in the future—will solve the hold-up problem.

Destitution and Positive Limited Liability. This discussion has so far been based on the premise that the

1. *For a discussion of the history of multiple liability provisions and a rationale for their application to U.S. banking, see Wilson and Kane (1996).*
2. *Hart and Moore (1994) define the inability to force labor as the "inalienability of human capital."*
3. *One might think that in a world of repeated contacts the loss of reputation on the part of the idea person would be sufficient incentive to "behave" (put forth effort). However, there is an end-game problem here. For example, if there are a finite number of times the idea person needs funds, he or she may well deliver as promised at the beginning of a relationship but have no incentive to produce after a certain point.*

worst that can happen to an individual is that he or she will "go broke," that is, reach zero income or wealth. Realistically, however, a very low (or zero) level of income may be insufficient to allow a worker to produce in the future. Dasgupta (1993) argues, for example, that a certain level of caloric intake is necessary if a laborer is to have the physical strength necessary to engage in agricultural or other economic production. This argument suggests that, for purposes of relevance to economic output, there is a strictly positive subsistence level below which certain economic resources such as food cannot fall.[4]

While the cost of a minimally nutritious diet is relatively trivial to most households in the more developed world, the need for positive subsistence levels is a large factor in the functioning of many economies throughout the less developed world. Moreover, the lack of serious consideration of these constraints might have important implications for economic theory, particularly so-called general equilibrium approaches that purport to model an entire economic system, albeit in an abstract and simplified setting. Dasgupta and others have argued that these fixed costs arising in the theory of consumer demand raise important questions regarding employment, wages, and the distribution of nonhuman capital, such as land.

Consider, for example, a situation in which $400 worth of calories per year is needed in order for a human to be productive in some economic activity (see footnote 4). This cost is fixed, and it can be assumed that individuals who have sources of wealth that allow them to achieve this intake will be extremely efficient relative to workers without this level of wealth. In particular, their production will, at some levels, display increasing returns to scale (that is, a small increase in labor input will produce a more than proportional increase in output once the fixed cost of $400 has been covered). Those unable to clear this nutritional hurdle will simply not be able to compete in the labor market; they may be able to survive, but they will not be productive in the conventional sense of the term. Thus, the distribution of nonhuman capital sources of production, such as land, becomes important. Even if there is sufficient aggregate wealth (and Becker 1993 notes that most countries have per capita incomes far exceeding subsistence levels) the distribution of that wealth may be such that it simply does not benefit individuals with wealth to hire workers who have access to no capital other than their own labor. Hiring an already healthy worker, even at a slightly higher wage, is simply more efficient than paying the fixed nutritional cost of hiring a malnourished one.

In a more developed economy, even someone who goes bankrupt will typically have access to income sufficient to cover his or her basic needs, either through labor or through a social safety net. However, since, conservatively, 300 million to 600 million people worldwide are in economic circumstances below the subsistence level, it is not meaningful to speak of personal limited liability as being simply a non-negative wealth position. It is in this sense that subsistence, and not zero, levels of income are the relevant ones for some of the analyses in the area of economic theory and practice.

Liability Rules and the Incentives of Debtors, Creditors, and Managers

There is a large body of work that seeks to analyze the importance of liability rules at the individual firm level in terms of the relationship between borrowers and creditors as well as potential conflicts between stockholders and managers. Major focal points in this area include investment and financing decisions of firms and the distortionary bargaining power generated by liability provisions in bankruptcy. Here, this liability structure will be examined in light of what conflicts induced by limited liability may arise with outside claimants, even when managers and owners have nonconflicting goals, and problems that arise when managers have their own, potentially separate, objectives and possess liability protection.

Creditors versus Owners. Consider the problem faced by creditors with multiple potential borrowers, some with relatively lower-risk ventures available for investment and others offering higher-risk projects. As noted by Stiglitz and Weiss (1981), a creditor is going to be unable, without further analysis, to distinguish among these potential borrowers and their associated projects. The borrowers, on the other hand, know that, should a lender grant them a loan, their payoff will be the larger of the difference between the value of the project less what they owe on the loan or zero. This limited liability associated with being the residual claimant, or equityholder, is well known.

A creditor faces the problem of choosing between (1) simply setting a loan rate that reflects what potential borrowers believe to be the average risk, based on, say, previous experience in the field for such a group of projects; (2) asking that potential borrowers post collateral (which they may or may not have); or (3) expending money on further investigation of potential projects (credit analysis). In all cases, the lender faces a problem brought on in large measure by the personal or corporate limited liability of borrowers. If simply setting a loan rate, a lender could charge a relatively low rate, in which event almost all potential borrowers would seek funds. But lender profits would be low or negative in this case, providing lenders the incentive to charge higher loan rates. Eventually, lower-risk borrowers, offering lower-risk investments, will find it unprofitable to seek bank financing, leaving banks with a relatively higher-risk pool of potential applicants.

As an extreme example, consider two potential borrowers, one with a project offering a certain 10 percent rate of return and the other with a project with an equal chance of paying 20 percent or 0 percent. If the lender

charges 5 percent, both borrowers will seek funds, while at 11 percent the borrower with the lower-risk project will obviously be unable to make a profit and will drop out. However, the borrower proposing the higher-risk project will, precisely because she has limited liability, continue to seek funds, since the best she can do is 9 percent (20 – 11 percent), while the worst is no profit (the project pays 0 percent and the borrower cannot pay off the loan).

This so-called adverse selection problem (at higher prices for credit, only the risky apply) may lead lenders to limit the supply of credit below that demanded by borrowers. Indeed, in this simple example there is no interest rate at which the creditor can expect to make a profit. As a result, the supply of credit will be zero while the demand for credit will be positive for any interest rate between 0 percent and 20 percent.

Another option open to lenders to help mitigate the "heads I win, tails you lose" advantage of the borrower is to require all potential borrowers to post collateral. But this solution poses its own problems. Requiring full collateral is likely unrealistic since, if borrowers could finance their own projects, they probably would not seek outside funding in the first place. And while partial collateral may alleviate the net effect of borrower-limited liability, the essential conflict between borrowers and creditors remains.

Obviously, lenders also engage in credit analysis. However, as long as risk assessment is less than a perfect science, there may remain groups of borrowers to whom banks are unwilling to lend at any interest rate. Clearly, none of the three proposed options is generally sufficient to eliminate the incentive problems associated with limited liability.

A problem closely related to the adverse selection issue involves the fact that limited liability provides, holding other factors constant, an incentive for a borrower to choose a relatively higher-risk project as opposed to a lower-risk project. Consider again the extreme numerical example, now supposing that a single entrepreneur has a choice between undertaking one or the other of the two projects. Since the expected return on the two projects is the same—that is, 10 percent = (0.5)(20 percent) + (0.5)(0)—the expected return to the borrower is actually higher for the riskier project. That is, the borrower is better off (in terms of the expected pecuniary reward) by taking the higher-risk and not the lower-risk project because, and in this case only because, the borrower has limited liability. For example, at an interest rate of 15 percent, the borrower would expect to receive either 5 percent (20 – 15 percent) or no profit by taking on the higher-risk project and nothing for taking on the lower-risk project.

This story would be different, however, if it were possible to impose a large enough nonpecuniary cost on the borrower in the event that she failed to repay the loan. Debtors prisons in earlier centuries exemplify such a cost. But of course this approach essentially begs the question since, for all intents and purposes, borrowers would no longer have limited liability.

It is sometimes argued that borrowers will not exploit the default option in repeated contacts in order to avoid reducing their reputation. Still, unless individuals derive some nonmonetary benefit from being thought well of in terms of meeting their obligations, entrepreneurs may continue to have an incentive to exploit their limited liability by taking on higher-risk projects.

This situation is not unique to the borrower/creditor relationship. While personal limited liability alone is an important factor in risk-taking decisions, the existence of corporate limited liability creates an additional layer of incentive problems in the relationship between equityholders in corporations and bondholders (debtholders in the firm).

As well as a direct effect on investment policy, corporate limited liability has an indirect effect on corporate capital structure decisions because shareholder gambling incentives are anticipated by rational creditors and priced into debt contracts.

One striking illustration of shareholders attempting to exploit limited liability occurred when the owners of Tri-State Paving, a small California contracting firm, responded to the threat of imminent bankruptcy by driving to Las Vegas to gamble with the company's liquid assets. A good day at the tables could yield a payoff sufficient to let the owners retain control of the firm; a bad day would lead to financial ruin—a situation no worse than it already faced. From the perspective of the owners, the Las Vegas investment was a no-lose proposition. The firm's creditors, of course, felt differently, as evidenced by the legal actions they took in response to Tri-State's innovative investment strategy.

Fortunately, most financially distressed firms do not gamble as blatantly as Tri-State did. In fact, debt covenants frequently preclude such blatant speculation. The problem in establishing such covenants is that often the outcomes of decisions made by firms are nonverifiable in that they are difficult or impossible for third parties to monitor. For example, a firm may decide to save

4. For example, Stigler (1945) estimates that a diet primarily consisting of dried beans, cabbage, and rice, at a cost of $400 per year in 1993 dollars (Becker 1993), is the least-cost diet consistent with the nutritional needs of the typical person.

money now by hiring a mediocre team of risk managers who can handle routine situations but may not be able to cope with complex problems that may arise. In most situations, this strategy will increase firm profits, but it increases the potential of generating huge losses when exceptional circumstances occur. Thus, this hiring policy increases risk. However, since employment policies are notoriously hard for third parties to second-guess, it would be very difficult to write debt covenants precluding such actions.

Corporate limited liability gives the shareholders of financially weak firms an incentive to gamble to the potential detriment of societal welfare. In the classical economic paradigm, the total value of a project includes all the benefits and costs associated with the project. Introducing a consideration other than total value (in this case, the riskiness of project returns) into the stockholders' investment calculus serves only to distract them from the objective of value maximization, a result that is socially harmful. As pointed out by John, John, and Senbet (1991), a consequence of this relationship is that even fairly priced deposit insurance for banks will not eliminate the incentive of banks to gamble.

At the same time, the incentive to gamble may actually counter other distortions related to investment externalities. For example, risky projects frequently are more innovative than safe projects. However, because of externalities (such as insufficient enforcement of patent laws) firms may underinvest in innovative projects. In such cases, then, corporate limited liability, by providing a countervailing incentive to choose more innovative risky projects, may actually increase social welfare. Indeed, Zha (1995) has shown that providing exceptions in bankruptcy can, in some circumstances, increase social welfare precisely by encouraging risk-averse entrepreneurs to invest in risky but socially valuable projects.

As well as a direct effect on investment policy, corporate limited liability has an indirect effect on corporate capital structure decisions because shareholder gambling incentives are anticipated by rational creditors and priced into debt contracts. This pricing effect can lead firms either to eschew debt financing in favor of equity or to reject profitable investment options altogether.

Box 1 provides a numerical analysis of this problem that can be summarized as follows: fully informed, rational potential bondholders recognize that equityholders can switch investment policies in a way that is detrimental to bondholders' interests in a manner analogous to the borrower/bank example already mentioned. These potential bondholders will incorporate this factor into their decision regarding the promised payments they demand from equityholders or, equivalently, the yields they require in order to hold the bonds. While equityholders may pledge personal assets as collateral, residual incentive problems, analogous to the borrower/banker case, may remain a problem. Thus, equityholders may be forced to forgo new debt financing even though the combined wealth of bond and stockholders may have been increased by an investment on the part of the firm.

An even bigger problem arises if shareholders have better information than bondholders do. This asymmetry of information creates a classic "lemons" problem. Issuers of new securities with bad information have an incentive to flood the market with overvalued securities. The profits from this strategy are proportional to the informational sensitivity to the claim being offered. Financial market participants recognize this fact and therefore react skeptically to the prospect of the issuance of information-sensitive securities such as equity. This reaction drives firms toward issuing information-insensitive securities to outsiders. The most informationally insensitive claim is, of course, a claim that pays a fixed amount regardless of the firm's value. However, given corporate limited liability, such a claim is not feasible when firm value is less than the minimum stipulated payment on the claim required to finance the investment. Thus, limited liability on the part of corporate investors increases the mispricing of corporate securities. When mispricing becomes large relative to the potential profits from the new investments funded by the security issuance, firms may, in fact, forgo profitable investment opportunities when forced to finance them on the capital market. Because, absent limited liability, firms can issue informationally invariant claims on firm cash flows and such claims entail no mispricing costs, corporate limited liability restrictions are necessary for informational asymmetries to lead to the mispricing of claims or underinvestment. Nachman and Noe (1994) provide a formal treatment of these issues.

Limited liability also affects the incentives of the financially distressed firm through its effect on bankruptcy negotiation. The key to this relationship is that bankruptcy is costly. For example, bankruptcy entails large legal and administrative expenses and may make it more difficult for a firm to market its product line.[5] Thus, both debtors and creditors can gain from avoiding bankruptcy. The division between both stockholders and creditors of the gains from avoiding bankruptcy will depend on their respective bargaining power.

In the United States, bankruptcy law grants stockholders a number of clear advantages. Perhaps the most important of these is the exclusionary period, a 180-day period after the filing for bankruptcy (which can be extended by the court) in which only shareholders can file reorganization plans. Because of corporate limited liability and the fact that corporate value is less than promised debt payments, all costs associated with remaining in bankruptcy during the exclusionary period are borne by creditors.

The upshot of this legal arrangement is that, even if after the exclusionary period ends and creditors can finally obtain the most favorable settlement possible from

Liability and Financing Decisions

The effect of corporate limited liability on financing decisions is illustrated by the example of Gamblers-Dream Enterprises, a company with a very simple structure of corporate cash flows and liabilities. All of its cash flows and debt obligations will accrue in the next period, called "time 1." The possible time 1 cash flows under its current operating policies are as follows:

Cash Flow	Probability
$100	.20
$500	.60
$900	.20

To simplify calculating values, assume that market values are synonymous with expected cash flows. Under current operating polices, the value of Gamblers-Dream is

$$100(0.2) + 500(0.6) + 900(0.2) = \$500.$$

Suppose that Gamblers-Dream has debt outstanding with a promised payment of $700. The market value of this debt at time 0, under the current operating policies, is

$$100(0.2) + 500(0.6) + 700(0.2) = \$460.$$

The value of the equity is the difference between total firm value and the debt value

$$\$500 - \$460 = \$40.$$

This firm appears to be in financial distress since the promised payment exceeds the firm's market value.

Suppose that Gamblers-Dream can change its operating policies to produce the following distribution of time 1 cash flows.

Cash Flow	Probability
$100	0.40
$500	0.30
$900	0.30

Calculating the firm value and the value of the debt, under the new cash flow distribution the value of the firm is

$$100(0.4) + 500(0.3) + 900(0.3) = \$460,$$

while the value of the debt is

$$100(0.4) + 500(0.3) + 700(0.3) = \$400.$$

Hence the value of equity is $60. It is clear that it is in the shareholders' interest to undertake this shift since their equity claim increases in value by $20, even though the value of the firm declines by $40. The decline in value of creditors' claims of $60 exceeds the decline in firm value by $20, which is the shareholders' gain.

Suppose that instead of having debt outstanding Gamblers-Dream needs to issue debt in order to finance its operating policies. In this case the $40 loss in market value is factored into the pricing of the debt. For example, suppose that the firm needs to raise $460 in external financing to undertake the project. If the firm borrows the $460, the promised payment, F, will have to satisfy the equation

$$460 = \min\{F, 100\}(0.4) + \min\{F, 500\}(0.3) + \min\{F, 900\}(0.3),$$

where $\min(\chi, \gamma)$ denotes the minimum of χ and γ.

This equation reflects the fact that the firm will choose the riskier operating policy. Guessing that a solution would have to be such that $F > 700$, this equation reduces to

$$\$460 = 190 + 0.3F.$$

Solving this gives $F = 900$. Thus, the only way the firm can obtain debt financing is to promise its entire cash flow to debtholders. Therefore, the shareholders would no doubt either switch to equity financing or eschew investing in the project entirely.

5. An interesting example of this effect is the problem that Wang Computers faced in trying to market its word processors to corporations when it faced financial distress. Corporations were understandably reluctant to commit to computer systems produced by a firm that might soon be defunct and unable to support its product line.

their perspective (absolute creditor priority), they still must bear the costs of the bankruptcy process. Limited liability protects the penurious shareholders from these costs, allowing them to use the threat of dumping the costs of bankruptcy on bondholders to force concessions in prebankruptcy negotiations. Shareholders may thus be able to negotiate a settlement in which the costs of bankruptcy are avoided and debt is written down sufficiently to ensure that they receive a fraction of firm value proportional to the costs of bankruptcy. Therefore, corporate limited liability, in the presence of costly bankruptcy options, not only protects shareholders from contributing their private capital in the event of financial exigency but also provides them with a cushion of residual value proportional to the costs of the bankruptcy reorganization. While rational potential claimants may factor this option to equityholders into their required returns, limited liability may result in actions like those described above once the firm is in financial distress. Box 2 provides a graphic example of this phenomena.

Owners versus Managers. For the purpose of this discussion, managers so far have been treated as agents acting in the best interest of shareholders. However, in almost all cases, save that of the sole proprietor who also manages the enterprise, there is an important potential conflict, fueled in part by the personal limited liability of the manager, between residual stakeholders (owners) and agents (managers), who actually implement policies and procedures. Indeed, Anderson and Tollison (1982) argue that this agency problem was the primary concern motivating Adam Smith in his much-discussed critique of the then relatively new limited liability corporations.[6]

BOX 2

Limited Liability and Bankruptcy

The following example illustrates the use of the exclusionary period to hold up creditors. Consider a firm that currently owes $1.4 million to creditors: $0.8 million on a senior debt issue and $0.6 million on a junior issue. The current value of the firm is $1.3 million. If the firm enters bankruptcy, the costs of bankruptcy and financial distress will eat up $0.3 million in firm value. If the shareholders' initial formal offer made after filing for bankruptcy is rejected, the delay caused by shareholders drawing out the automatic stay period will result in an additional $0.1 million loss.

The actions taken by shareholders and creditors will depend upon what these agents predict about what will occur in the next stage of the reorganization. For this reason, it is useful to first consider what will happen if the final stage of negotiations is reached—the stage after the exclusionary period has elapsed, when creditors can make a proposal. At this point, firm value is

$$1.3 - 0.3 - 0.1 = \$0.9 \text{ million.}$$

At this stage, creditors can force a division based on absolute priority. The payoffs would be

Shareholders:	$0
Junior debt:	$0.1 million
Senior debt:	$0.8 million

Thus, before the final court-ordered disposition of assets, shareholders might prefer to offer an acceptable alternative.

Shareholders:	$0.05 million
Junior debt:	$0.15 million
Senior debt:	$0.8 million

If shareholders declare bankruptcy without delay, they will obtain $0.05 million, senior debt will be unimpaired receiving $0.8 million, and junior debt will lose $0.45 million. The cost of bankruptcy gives shareholders bargaining power.

Also, in lieu of declaring bankruptcy, shareholders can make a first and final offer to restructure debt by lowering the promised payment to junior debt to $0.15 million and threaten bankruptcy if the offer is rejected. Junior debt, if it finds the threat credible, will accept the offer. The threat of forcing bankruptcy is credible because of corporate limited liability. Absent renegotiations, the shareholders have nothing to lose.

From this example we see that corporate limited liability exerts an effect upon the allocation of value, even in firms that have failed. Limited liability comes into play because shareholders can threaten to use limited liability in bankruptcy negotiations.

A manager has every incentive to engage in activities that maximize his or her welfare so long as it is costly for shareholders to monitor the effort put forth or output produced by the manager. Much of this compensation may take the form of perquisites such as limousines, deluxe furnishings, and extra staff. Personal limited liability limits the damages that owners can extract from their agents, absent criminal plundering of the firm, so the efficacy of shareholders' monitoring of management becomes a key determinant of corporate efficiency. However, since corporate limited liability also limits the losses of shareholders to their initial investment, it clearly attenuates the incentives of shareholders to monitor managers. For this reason, firms where monitoring is particularly important, such as Lloyds of London, might not provide owners with limited liability protection.

Given the adverse effect of limited shareholder liability on owner monitoring of managers and creditor monitoring of owners, it would appear, at first glance, that unlimited shareholder liability would generate welfare improvements relative to limited liability. However, as Winton (1993) shows, this conclusion does not hold uniformly. Unlimited liability, combined with the transferability of shareholdings, means that the expected payoff from holding shares depends on the identity of their owner. A wealthy investor knows that he will be forced to pay when a firm incurs large losses. A poor investor, on the other hand, knows he is protected by personal limited liability from being forced to make large payments to the firm. Because the expected payoffs on shares are higher for poor shareholders than they are for rich shareholders, this disparity generates an incentive, other things held constant, for rich shareholders to sell to poor shareholders. Thus, in a situation with unlimited corporate liability, the rich may end up owning bonds while the poor own stock. The result can be a decline in efficiency: since the poor have small liquid balances to finance unexpected capital needs of the firm in the event that investment opportunities look particularly rewarding, external funds may have to be raised to finance growth. The resulting need for new investors implies increased flotation and other related costs that may more than offset the reduced monitoring engendered by granting shareholders the protections of limited liability.

Governments, Intermediaries, and the Structure of Financial Markets

As previously shown, limited liability has the potential to distort investment and financing decisions at the individual firm level. Moreover, it has been argued that increasing liability beyond initial investments creates socially inefficient risk sharing because, under these circumstances, the value of shares will be inversely related to investors' private wealth. A solution to this problem would be to allow outside claimants to seize the assets of a firm while it is still "alive," although it is notoriously difficult to determine the market value of many assets, particularly those that are not actively traded in financial markets.

Given such measurement problems, alternative contracts have evolved that specify that shareholders must either have sufficient liquid assets on hand to meet current obligations or be able to borrow the necessary funds from an outside entity. Under these circumstances, the ability to access liquidity works as a signal (albeit an imperfect one) that a firm is economically solvent. Moreover, in modern times, central banks have emerged as the ultimate providers of liquidity (that is, the lender of last resort). It is therefore useful to review the role of corporate limited liability in the context of central bank provision of liquidity through the banking system and other government insurance programs.

Bank Charters and Limited Liability. It is generally thought that the first institution to be granted corporate limited liability status was the Bank of England (BOE), then a private institution. The monarchy, in need of financing, struck a deal with the BOE and, in the process, granted it sole authority to act as an agent to the government in terms of the circulation of currency. Included in this arrangement was a provision that BOE "shareholders" would not be held personally liable for any debts incurred by the new corporation (Bagehot [1873] 1991). Before long, any number of commercial firms were appealing to the crown for similar liability protection and monopoly rights to trade either certain goods or in certain areas of the world.

Historically there has been a great deal of variation in the liability rules regarding individuals engaged in the business of brokering money and credit. In Europe, financial institutions other than central banks were often denied corporate limited liability long after this status (often accompanied by monopoly trading and governing rights) was allowed to commercial firms. Even after the advent of essentially universal access to corporate limited liability, financial institutions, including twentieth-century investment banks as well as accountants and lawyers, continued to operate under the partnership structure, that is, without the protection of limited liability.

Banking, as much or more than almost any other industry, has been the subject of extensive debate and policy discussions concerning liability rules. For example, Evans and Quigley (1995) provide a lively and insightful discussion of shareholder liability regimes as well as an analysis of some data from nineteenth-century Scottish

6. The manager/owner conflict can be viewed as a special case of the principal/agent problem discussed by Adam Smith and formalized by more recent writers such as Ross (1973).

banking, where corporate limited liability and unlimited liability (personal limited liability only) institutions competed for deposits and investors. They suggest that the dominance of one liability structure over another will depend on whether it is cheaper to monitor the quality of the assets or the personal wealth of the investors providing guarantees. If the former is less costly, corporate limited liability organizations will dominate, and vice versa if asset values are more costly to verify than personal wealth. This argument is consistent with the proposal that, should a banker be able to post sufficient personal collateral, the value of which is verifiable, depositors could eliminate the potentially negative influences of limited liability. It is also consistent with the idea that as a sophisticated system of "monitoring the monitors" (the professional auditing industry) emerged, the other advantages associated with corporate limited liability caused this organizational structure to become dominant in banking in the twentieth century. These advantages primarily involved the easing of risks associated with transferring ownership (Woodward 1985).

Indeed, it is difficult to imagine the set of advanced financial markets and contracts that have developed over the past two centuries without some restrictions on the seizure of the personal assets of existing and potential shareholders. Interestingly, however, multiple liability provisions, requiring some additional capital infusions by shareholders in bankruptcy, were not eliminated in the United States until around the time the Federal Deposit Insurance Corporation (FDIC) was formed in 1933. In essence, at least for small depositors, the FDIC substituted a guarantee from the government for private guarantees by bank shareholders.[7]

Limited Liability and the Lender of Last Resort. Other governmental or quasi-governmental agencies established by efforts to improve the functions of the economy may cause liability-induced behavioral changes in many areas of commerce and the delivery of financial services as well. Consider, for example, the development of the central bank. The central bank, acting as a lender of last resort, works through a subset of financial institutions in order to provide for an elastic currency. Practically, this means it provides liquidity to the financial system during times of stress. These times of need arise in situations when market participants, because of less than full information, have trouble distinguishing economically solvent from insolvent firms. In times when there is great uncertainty investors often seek liquidity. Absent a central bank, "corners" on the provision of liquidity might arise where its provision is left solely to private institutions (Donaldson 1988). Thus, the existence of a lender of last resort allows private institutions of all types, to some degree or another, to hold fewer liquid assets and increase investments in riskier but, on average, more profitable ventures.

In the United States, banks and thrift institutions pay a positive tax for privileged access to the discount window by, among other things, holding zero-interest-bearing accounts at the Federal Reserve. At the same time, other firms also tend to benefit from the lender of last resort actions by being able to draw their short-term liquidity directly or indirectly through the banking system. To the extent that not all claims on these corporations or partnerships are counteractable (Grossman 1995), there may be welfare effects as these other institutions hold less liquidity than they would in the absence of a lender of last resort (Calomiris 1989; Smith 1993). Limited liability plays a role in this situation because, with less than a full array of contracts to cover all contingencies, managers of these institutions, acting in the interests of shareholders, rationally have an incentive to exploit the optionlike characteristic of their residual claim on the cash flows from production.

Of course, a similar argument can be made for institutions with explicit or implicit government guarantees. They too may have an incentive to hold less liquid positions than they would in the absence of backing by the government. In short, the brute force of limited liability can potentially tend to exacerbate the risks faced by policymakers concerned with stabilizing financial markets during times when, for whatever reason, liquidity is in short supply.

There is also a potentially positive view of this provision of emergency liquidity. Bernanke (1983), for example, has provided evidence to support the idea that much of the economic damage in the Great Depression was caused by the failure of banks and their customers, eliminating valuable information concerning whether firms were fundamentally solvent but in financial distress or essentially bankrupt. In this sense, bankruptcies can be viewed as socially costly and the public provision of liquidity through the central banking system can be viewed as a way of minimizing these costs, particularly during times of stress in markets and the banking system (Holmstrom and Tirole 1996). That is, if the social costs of bankruptcies are high, then the provision of liquidity to temporarily weak but fundamentally sound economic units may actually improve the welfare of the society despite the partially offsetting effects of limited liability.

Conclusion

This article has reviewed some of the effects of liability structure on the actions of individuals in financial and labor markets. With roots stretching back at least to the early days of the Bank of England, corporate limited liability has had a strong influence on the development of modern capitalism. Resulting improvements regarding transferability of ownership have greatly enhanced the flow of financial capital and encouraged riskier ventures than might have been taken

if stockholders were personally liable for more of an endeavor. However, these same risk-taking incentives may cause conflicts of interest at both the macro- and microeconomic level. From central banks providing an elastic supply of liquidity in times of financial crises to government guarantees, limitations of liability have at times resulted in risks taken at the firm level that may not be socially optimal. Policymakers, in their quest to balance social goals with excessive risk taking, should be aware that decisions made in the name of safety and soundness may result in unintended consequences.

Corporate liability risks can even drive a wedge between contracting parties in the sense that the rational reaction by outsiders to the option value of limited liability held by stockholders may result in investment, financing, and security design decisions that would not be optimal if liability provisions were less generous. Even in bankruptcy negotiations, the limited liability option is potentially valuable to stockholders who may hold up creditors with the threat that they can walk away, leaving claimants to pay the bankruptcy costs associated with dissolving a firm. Limited liability has also proven to be an important factor in the adverse selection (only the risky apply) and moral hazard (taking on riskier ventures) problems often encountered in borrower/bank relationships. Absent nonpecuniary costs (such as debtors prison), complications due to limited liability may be sufficiently severe to cause some or even all borrowers to be credit rationed.

Personal limited liability may also act as an incentive in labor contracting arrangements, whereby individuals sell their ideas and then hold up outside claimants for additional compensation for their needed labor efforts. Or, given the fact that, realistically, a positive amount of income is needed in order to engage in productive effort, the assumption that personal limited liability is zero, and not a subsistence value, may result in a cycle of unemployment and malnutrition for at least a portion of a population.

Although this article has covered but a portion of the issues arising from the existence of corporate and/or personal liability, these and other examples are sufficient to show that alterations in liability provisions have changed the nature of contracting in ways that require us to remember that the buck does stop somewhere, and where it stops is not irrelevant from either a private or public perspective.

7. While the system of public insurance has been established in the United States for more than sixty years, it is not surprising that many of the problem financial institutions in the 1980s were those that were allowed to remain open even though their liabilities exceeded their assets. With limited liability and, for all intents and purposes, no investment in the firm, managers of these institutions had every incentive to take on high-risk projects in the hopes of growing out of their problems.

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