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REPUTATION AND CONSTRUCTIVE AMBIGUITY IN FINANCIAL CONTRACTING

by

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Abstract

The paper proposes a theory of ambiguous financial contracts. Leaving contractual contingencies unspecified may be optimal, even when stipulating them is costless. We show that an ambiguous contract has two advantages. First, it permits the guarantor to sacrifice reputational capital in order to preserve financial capital as well as information reusability in states where such tradeoff is optimal. Second, it fosters the development of reputation. This theory is then used to explain ambiguity in mutual fund contracts, bank loan commitments, bank holding company relationships, the investment banker's "highly confident" letter, non-recourse debt contracts in project financing, and other financial contracts.

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"My Word is My Bond"
--Lintel: London Stock Exchange

1. Introduction

Ambiguity is an attribute common to financial contracts. A striking example is the loan commitment wherein the bank reserves the right to void the contract if it, notably not an objective third party, determines that the financial condition of the commitment owner has deteriorated. This "escape" or "general nervous" clause is found in virtually all bank loan commitments as well as in investment bankers' "highly confident" letters. It is our purpose to explain such ambiguity in financial contracts in settings where greater precision is not technically or economically precluded.

Our explanation is based on the related notions of flexibility and reputation. Consider a financial institution with reputational capital and some finite financial capital that is reflected on its balance sheet. The reputational capital reflects the market's beliefs about the institution's likelihood of honoring its guarantees. The higher the reputation, the more the market should be willing to pay for the institution's guarantees. If the institution writes a precise guarantee, it is legally bound to honor the contract. Thus, if a claim eventuates, it will pay to the extent possible by writing down its financial capital. Even if insolvency does not result, the guarantor's risk-of-ruin certainly rises. Given unbooked--nontransferable--assets, such as reputational capital or reusable information, the guarantor could benefit by not paying the claim and thereby sacrificing some of its reputation in favor of avoiding insolvency. The

unbooked assets create the risk avoidance incentives of bankruptcy costs.

With an ambiguous guarantee, the guarantor is not legally bound to honor the contract. If it chooses not to pay the claim, it substitutes reputational for financial capital. That is, the guarantor can either pay against the claim and accept the nondissipative write-down of its financial capital, or it can reject the claim and accept a dissipative charge against its reputational capital. The ambiguous contract therefore provides the guarantor additional degrees of freedom in managing its balance sheet. In addition, ambiguous contracts will be shown to facilitate reputation enhancement.

If financial intermediaries develop reputations in connection with their brokerage activities, particularly where the objects of search are fraught with observability problems, then this would explain their proclivity to write ambiguous financial contracts. The constructive ambiguity permits the firm to exercise greater control over the inherently illiquid reputational asset.

An example of the type of ambiguity we model here is provided by the recent experience of a Dutch investment group, Robeco, which manages share, bond, and property funds. Most of its funds have an implicit guarantee of price support, among them the real-estate linked Rodamco fund. For the past 11 years, Robeco has followed the practice of buying back Rodamco's shares at net asset value from any investor wishing to sell. Recently, however, it publicly announced a suspension of this policy, a move that sent reverberations through the Amsterdam bourse. We quote (emphasis ours):

> Trading is scheduled to resume today in Rodamco, the large Dutch property investment fund which stunned the Amsterdam bourse

on Monday with the news that it was suspending its traditional policy of buying back shares when asked to do so by investors.

Analysts say a substantial fall in share price is inevitable, with estimates ranging from 10 per cent to more than 20 per cent. The shares closed at Fl 73.30 on Friday.

Though trading remained suspended yesterday, Rodamco's sudden switch on Monday from an effectively open-end structure to a closed-end structure continued to have a knock-on effect on the Dutch property sector.

Analysts said Rodamco's move--which came as a shock despite provisions in its statutes which allow for a reversal of policy--had also caused a dent in confidence in its owner, the Rotterdam-based Robeco Group, Europe's biggest independent fund manager.

"Robeco's image is tarnished, but I think that people believe it when it says that it has no plans to make a similar switch in the way it operates its share and bond funds," one analyst said.

Financial Times, September 26, 1990.

We view this event as an illustration of a firm "writing down" its reputational capital in order to conserve financial capital. In doing so, the firm is exploiting the ambiguity in its contract with investors to facilitate the joint management of reputational and financial capital.

There are, of course, other approaches to explaining contractual ambiguity. One approach is to view future state-contingent outcomes as being too complex to permit precise contracting over these outcomes at reasonable cost (Williamson (1975)). This incomplete contracting approach has been used by Hadfield (1988) and Hart and Moore (1988), among others.[1] Another approach is to interpret ambiguity as attenuating moral hazard. Boot and Thakor (1990) formalize this argument.[2] A third approach can be found in the literature on implicit contracting (Bull (1987)), where it is assumed that explicit contracts cannot be enforced in some states and implicit contracts are incentive compatible and consequently are honored.[3]

The principal contributions of our analysis are twofold. First, we establish conditions under which contractual ambiguity is preferred by the contracting parties, even when precision is readily attainable. That is, we seek to explain why ambiguity may be constructive and an instrument of choice. Second, we develop a link between contract choice and reputation development. In the literature on reputation, the contract between the uninformed and the party attempting to gain a reputation typically is exogenously specified and reputational incentives for settling the contract are analyzed. We show that reputational incentives are affected by contract choice, and endogenize the choice of contract on that basis.

The rest of the paper is organized in four remaining sections. Section 2 presents the model. Section 3 contains the analysis. Section 4 discusses some applications. Section 5 concludes.

2. The Model

The contract we analyze is one where an intermediary X ("the broker") promises to make a state-contingent future payment to Y (the "customer"), in exchange for which Y pays X an initial fee. This type of contract is widely observed; loan commitments, deposit insurance, and highly confident letters, all fit this description. We will first illustrate the economic role of such an arrangement.

Consider the following example. X provides a matching service for a lender (Y) by locating a borrower (Z) with desirable credit characteristics. In general, this will require that X produces information to locate Z. The need for a guarantee now arises if information production is costly to X, and unobservable to others. Without a guarantee X may randomly assign a Z

to Y and save on information production costs. With a guarantee that promises a payment from X to Y if Z defaults, producing information may reduce the expected value of this state contingent payment and thus be privately optimal for X.

What we have described thus far does not address X's financial capability to honor the guarantee. This is not particularly limiting as long as there is no uncertainty about X's type. Suppose now that X's financial capability evolves stochastically and X is privately informed about the probability distribution that determines this capability, as well as about his actual financial capital. Moreover, let us suppose that X has a multiperiod planning horizon. In this case information he produces about Z in the first period is potentially reusable, either intertemporally (X seeks the same Z in the second period that he had selected in the first period) or cross-sectionally (the Z in the second period is sought from a pool similar to that from which the first period Z was drawn), so that it costs less to produce information that ensures the desired credit characteristics, or both (Chan, Greenbaum and Thakor (1986)). Information reusability makes it privately costly (and socially wasteful) to terminate prematurely.

Such termination may be unavoidable with a precise contract. Moreover, to the extent that X's financial capital evolves randomly, bad luck alone could force X into a situation in which he is financially incapable of meeting his obligation. This is where an ambiguous contract can help since X is not legally bound to honor the contract. The guarantor can honor the contract if his financial capability permits and walk away otherwise. Since the guarantor's capability is known only to X, it is entirely up to X

whether or not to honor the contract. Clearly, if there was no uncertainty about X's "type"--so that reputational concerns were moot--guarantees made under ambiguous contracts would be worthless because they would never be honored. Asymmetric information about X's type, however, can create an inducement for X to develop a reputation for reliability. This reputational concern will then confront X with a tradeoff in the state in which he is financially capable of making the guaranteed payment. If he honors the contract, he loses financial capital but sacrifices reputational capital. If he declines to honor the contract, he conserves financial capital but sacrifices reputational capital. We show that there are circumstances in which it is ex ante efficient to specify the guarantee ambiguously.

A. Types of Contracts and Information Structure

There are three periods and four points in time, t = 0, 1, 2, and 3. At the start of each period (i.e., at t = 0, 1 and 2) X and Y can "negotiate" either a precise or an ambiguous contract. Formally, this is a game in which the informed agent (X) moves first by offering Y a contract, and then Y (the uninformed agent) moves next by either accepting or rejecting the contract. Under this contract, X expends an information production cost to provide a "matching" service for Y, and then Y may, at a future date, make a claim against X's financial capital. At the end of each period, we assume that the claim is exercised with probability q. If a claim is made under a precise contract, X faces bankruptcy if he fails to fully discharge the claim. Bankruptcy is interpreted as an event in which all of X's financial assets are confiscated and transferred to Y.[4] With an ambiguous contract, X can continue in business even if he fails to honor the

claim. Thus, in this game, X moves first at the start of the period, and then moves last at the end of the period. X's strategies involve the type of contract to offer at the outset and whether or not to honor the contract if a claim is exercised.

X can be either of two types. Let $i \in \{L,H\}$ be X's type. The only difference between L and H is in the probability distributions that determine the stochastic evolution of their financial capital levels. Both start out at $t = 0$ with capital K_0. After that, the capital receives a random shock, $\tilde{\theta}$. The probability distribution of this random shock has a two-point support. It will either augment the existing capital by a positive amount, θ, or it will drive it to zero. Assume that the guarantee is for an amount $M < \theta$. Thus, the evolution of X's capital will depend on exogenous uncertainty as well as on whether X issued a guarantee (and honored it) or not. Figure 1 plots the various possible paths of capital. The probability that $\tilde{\theta}$ will equal θ is p_i, i.e., it is type-dependent. We assume that H is the "better" type, so that $1 > p_H > P_L > 0$. Further, X is privately informed about his type. The common prior belief assigned by the "market" (all agents other than X) is that the probability that X is H is $\gamma \in (0,1)$.

<Insert Figure 1 Here>

With these preliminaries, there are three relevant states in any period: a state with no claim under the guarantee, and states in which a claim occurs and X is either financially sound or not. These are listed in Table 1.

Table 1: Description of States

State	Probability of Occurrence	Description
N	$1 - q$	No claim
$\bar{C}$	qp_i	Claim, X financially sound
$\underline{C}$	$q[1 - p_i]$	Claim, X in zero-resource state

B. Reputation and Fee Structure

Let ψ_t be the probability, assigned by the market at time t, that X is of type H, i.e., the perceived quality (reputation) of X. At $t = 0$, $\psi_0 = \gamma$, and thereafter ψ_t evolves in accordance with the Bayesian posteriors formed by the market as it observes X's behavior. Let $f_t^j \equiv f^j(\psi_t)$ be the fee charged by X for the guarantee made under contract $j \in \{P,A\}$, where P stands for "precise" and A stands for "ambiguous." Since the guarantee is always made to cover a contingency one period hence, payment under a guarantee made at t will only be required at $t + 1$. We assume that the guarantee portion of contract $j \in \{P,A\}$ is fairly priced. That is, f_t^j is equal to the expected value of the payment to be made by X under the guarantee, with the expectation taken with respect to Y's beliefs as embodied in ψ_t. Let $\phi_t^j \equiv \phi_t^j(\psi_t)$ be the brokerage fee charged by X at time t under contract $j \in \{P,A\}$.

Note that f_t^j does not compensate an X of type H for the externality imposed by a type L agent, nor does it compensate for the information production cost. Thus, the type H intermediary's participation constraint is violated if f_t^j is all he receives. We assume that adding the brokerage

fee $\phi_t^j = \phi_t^j(\psi_t)$ enables satisfaction of this participation constraint. As we will see, this fee enables X to earn rents related to reputation and the intertemporal reusability of information. The reusability of information is captured by assuming that the information production cost for an intermediary who has survived one period or longer is $\bar{V}^* < \bar{V}$, the cost for a de novo intermediary.

At any point in time, the brokerage fee that X can charge is anchored by the amount it would take for a new intermediary to participate. That is, $\phi_t^j = \phi_t^j(\psi_0) \equiv \phi_t^j(\gamma)$. A new intermediary charges a guarantee fee, $f_t^j(\gamma)$, that reflects his reputation, and $\phi_t^j(\gamma)$ is such that $f_t^j(\gamma) + \phi_t^j(\gamma)$ enables this intermediary's participation constraint to hold tightly. Since an established intermediary enjoys a better reputation, he can charge a higher guarantee fee. Moreover, he has a lower information production cost, so that he earns a net rent relative to a new entrant.

3. Benefits of Ambiguity

The question we wish to answer is whether X and Y would choose an ambiguous contract if confronted with a choice between such a contract and one that is precise. Because of the usual endgame problem, it is clear that at $t = 2$ only precise contracts will be demanded by Y. In principle then, ambiguous contracts can be offered at $t = 0$ and $t = 1$. One benefit of ambiguity is that it provides the guarantor with the flexibility to preserve information reusability and to capture the related rents even in the state when its financial capital would otherwise be depleted.

A. Conjectured Equilibrium Strategies and Intuition

In Table 2 we summarize the conjectured equilibrium strategies of X with an ambiguous contract at t = 0 and precise contracts at t = 1 and t = 2. In each period, the conjectured equilibrium contract has both types H and L offering the same contract.

Table 2: Equilibrium Strategies of X

State	Probability of Occurrence		X's Strategy with Respect to Honoring Contracts			
			Ambiguous Contract at t = 0		Precise Contract at t = 1,2	
	H	L	H	L	H	L
N	$1 - q$	$1 - q$	—	—	—	—
$\bar{C}$	qp_H	qp_L	Honor	Default and continue	Honor	Honor
$\underline{C}$	$q[1 - p_H]$	$q[1 - p_L]$	Default and continue	Default and continue	Default and terminate	Default and terminate

A key feature of this conjectured equilibrium is that the type H intermediary prefers an ambiguous contract at t = 0. Its advantage relative to a precise contract is that H can better preserve valuable informational surplus because he can continue to function for at least one more period, even if the bad state $\underline{C}$ occurs. The disadvantage is that it permits L to default even in the good state $\bar{C}$. Since Y will take this into account in determining the price she is willing to pay for the contract, the negative externality imposed on H due to the presence of L is greater with an

ambiguous contract than with a precise contract. In other words, for any contract, the presence of L lowers the price that the contract can be sold for, and this price reduction is greater for an ambiguous contract than for a precise contract. This follows because, with a precise contract, conditional on a particular state realization ($\underline{C}$ or $\bar{C}$), the contract-honoring strategies of types H and L are identical; the only difference between the types is that H has a lower probability of being in state $\underline{C}$ and hence has a lower default probability. With an ambiguous contract, however, the behavioral difference between the types is greater since H only defaults in state $\underline{C}$, whereas L defaults in both states $\underline{C}$ and $\bar{C}$. The greater externality imposed by L with an ambiguous contract implies that H will offer such a contract at $t = 0$ only if the incremental expected surplus obtainable with an ambiguous contract (relative to a precise contract) exceeds the incremental costs of the externality.

The question is: Why does L default at $t = 1$ on an ambiguous contract in state $\bar{C}$ when H does not? To see this, let us first examine the incentive that H has to honor the contract at $t = 1$ in state $\bar{C}$. Although state realizations are unobservable to the market, it is common knowledge that L is more likely to be in $\underline{C}$, the state of financial impairment. By honoring the contract, H can distinguish himself from L since the market will infer that: (i) state $\bar{C}$ has been realized (this state is more likely for H), and (ii) the intermediary is of type H (since L's equilibrium strategy is never to honor an ambiguous contract). This enhancement in reputation permits H to sell his second period precise contract[5] at a more favorable price.[6] This gain is also available to L, should he decide to mimic the strategy of H and honor the contract in state $\bar{C}$. That is, honoring a first-period

ambiguous contract at t = 1 has the same reputational benefit over the second period for both types H and L. Therefore, if we had only two periods, incentives for honoring the contract would coincide for both types. This is why a third period is important. If either $\bar{C}$ or N is realized at t = 2, then an intermediary that honored an ambiguous contract at t = 1 would be able to reuse the resulting reputation for the third period and obtain a favorable price on the precise contract for the third period. This reputational benefit is not available if state $\underline{C}$ is realized at t = 2 because that state is absorbing and terminates the process. Now, at t = 1, H assesses a lower probability to being in state $\underline{C}$ at t = 2 than does L. Hence, the benefit of developing a reputation by honoring an ambiguous contract at t = 1 is greater for H, leading L to behave more myopically at t = 1. This establishes why (in absence of a fourth period) the second period contract must be precise.

B. Analysis and Results

We begin by analyzing precise and ambiguous contracts without reputational considerations.

Lemma 1: Suppose we ignore second and third period payoffs. Then, given the conjectured equilibrium strategies in Table 2, the cost of the externality created by the presence of the type L intermediary is higher with an ambiguous contract in the first period than with a precise contract.

Proof: With the conjectured equilibrium strategies, L defaults on an ambiguous contract in both states $\bar{C}$ and $\underline{C}$, whereas H defaults only in state

C. Thus, the guarantee fees are

$$f_0^A = q\gamma p_H M \tag{1}$$

$$f_0^P = q[\gamma p_H + (1 - \gamma)p_L]M, \tag{2}$$

and $f_0^A < f_0^P$. At t = 0, H assesses his expected liabilities on the first-period guarantee under the ambiguous and precise contracts as L_0^A and L_0^P, respectively. But

$$L_0^A = L_0^P = qp_H M. \tag{3}$$

From (1), (2) and (3) it follows that

$$f_0^A - L_0^A < f_0^P - L_0^P < 0. \tag{4}$$

Thus, an ambiguous contract imposes a strictly larger externality in the first period. Q.E.D.

Let $\psi_t^j(H|\Omega_t)$ be the probability that Y attaches at time t to X being of type H, where the first-period contract was $j \in (P,A)$ and the information set of Y is Ω_t. In the discussion below, the second and third period contracts are assumed to be precise. For sequential rationality (Kreps and Wilson (1982a)), when Y observes a move by X that is a part of the equilibrium set, her beliefs must be revised in accordance with Bayes' rule. The set Ω_0 consists of Y's prior beliefs regarding X's type. Thus,

$\psi_0^j(H|\Omega_0) = \gamma$ for $j \in (P,A)$.[7] At each of the time points $t \in \{1,2\}$, Y observes X's strategy with respect to honoring or defaulting on the contract. Let n_t denote "no claim," h_t denote "honor," and d_t denote "default" at time $t \in \{1,2\}$. Thus, we have

$$(5) \qquad \begin{aligned} &\psi_1^A(H|h_1) = \psi_2^A(H|h_1,n_2) = \psi_2^A(H|h_1,h_2) = \psi_2^A(n_1,h_2) = 1 \\ &\psi_1^A(H|n_1) = \psi_2^A(H|n_1,n_2) = \psi_0^A(H|\Omega_0) = \gamma \\ &\psi_1^A(H|d_1) = \psi_2^A(H|d_1,n_2) = [1 - p_H]\gamma(1 - p_H\gamma)^{-1} < \gamma \\ &\psi_2^A(H|d_1,h_2) = p_H[1 - p_H]\gamma(p_H[1 - p_H]\gamma + p_L[1 - \gamma])^{-1} > \psi_1^A(H|d_1) \end{aligned}$$

$$(6) \qquad \begin{aligned} &\psi_1^P(H|n_1) = \psi_2^P(H|n_1,n_2) = \gamma \\ &\psi_1^P(H|h_1) = \psi_2^P(H|n_1,h_2) = \psi_2^P(H|h_1,n_2) = p_H\gamma(p_H\gamma + p_L[1 - \gamma])^{-1} \\ &\psi_2^P(H|h_1,h_2) = [p_H]^2\gamma([p_H]^2\gamma + [p_L]^2[1 - \gamma])^{-1} \end{aligned}$$

Note that all posteriors involving either d_1 or d_2 are ignored since the intermediary is out of business in either case. We now examine the reputational gains from honoring precise and ambiguous contracts.

Lemma 2: Honoring an ambiguous contract in the first-period (at $t = 1$) leads to a strictly larger increase in reputation than honoring a precise contract.

Proof: $\psi_1^A(H|h_1) > \psi_1^P(H|h_1)$, while $\psi_0^A(H|\Omega_0) = \psi_0^P(H|\Omega_0) = \gamma$. Q.E.D.

This result points to an important benefit of an ambiguous contract for type H. It enables him to enhance his reputation more effectively than is

possible with a precise contract. The intuition is related to our earlier discussion that the ambiguous contract tends to amplify the behavioral differences between types H and L. We now explore this issue further.

Lemma 3: Suppose that the first-period contract is ambiguous and state $\bar{C}$ occurs at t = 1. Then, given the conjectured equilibrium strategies and the associated Bayesian updating, the effect of adopting strategy h on the expected reputation of X in the third period (i.e., at t = 2) is strictly higher if X is of type H than if he is of type L. The effect of adopting strategy h on the second period (i.e., at t = 1) reputation of X is identical across both types.

Proof: The (second period) reputation implications of honoring and defaulting on an ambiguous first-period contract are $\psi_1^A(H|h_1)$ and $\psi_1^A(H|d_1)$, respectively. The difference, $\psi_1^A(H|h_1) - \psi_1^A(H|d_1)$, is identical for both types H and L. We now consider third period reputation. Reputational gains accrue to X only if he is still in business in the third period. For H, the expected difference in his third period reputation from honoring the ambiguous contract versus defaulting on it at t = 1, is

$$(7) \qquad K(H) = [1 - q]\psi_2^A(H|h_1,n_2) + qp_H\psi_2^A(H|h_1,h_2) - \{[1 - q]\psi_2^A(H|d_1,n_2) + qp_H\psi_2^A(H|d_1,h_2)\}$$

The corresponding expression for L is

$$(8) \qquad K(L) = [1 - q]\psi_2^A(H|h_1,n_2) + qp_L\psi_2^A(H|h_1,h_2) - \{[1 - q]\psi_2^A(H|d_1,n_2) + qp_L\psi_2^A(H|d_1,h_2)\}$$

Comparing (7) and (8) we see that $K(L) < K(H)$. Q.E.D.

For the first of our two major results, we assume that X is locked into the contract choices stipulated in the conjectured equilibrium. We will permit contract choices in the subsequent proposition.

Proposition 1: Suppose that we take as given the contract choices stipulated in the conjectured equilibrium. Then the conjectured equilibrium strategies of honoring and defaulting are sustained if

$$(9) \qquad p_L < \frac{\{q[p_H - p_L]\}^{-1} - [\psi_1^A(H|h_1) - \psi_1^A(H|d_1)] - [1 - q][\psi_2^A(H|h_1,n_2) - \psi_2^A(d_1,n_2)]}{q[\psi_2^A(H|h_1,h_2) - \psi_2^A(H|d_1,h_2)]} < p_H$$

Proof: See Appendix.

As noted earlier, Y compensates the type H intermediary sufficiently at the outset so that his participation constraint is met. Since Y cannot prevent X of either type (H or L) from earning positive profits in the future,[8] the initial brokerage fee, ϕ_0^j, could be set so low that the intertemporal participation constraint for H is binding. In other words, ϕ_0^j is set to ensure that the intermediary's second and third period expected profits are offset by its first-period loss. However, since the purchaser of the guarantee (Y) has the option to switch to another intermediary after the first period, the first period loss may not be recouped. We think that

a more natural specification is to allow X to earn at least zero expected profit in each period. To the extent that this may allow X to earn future rents, we can imagine that there is competitive bidding by intermediaries for licenses that reflect their future expected profits. Thus, Y is indifferent between an ambiguous and a precise contract and X captures all the potential surplus from an ambiguous contract relative to a precise contract. In this setting, the first period brokerage fee, ϕ_0^j, is not affected by the potential future rents. We now have our final result.

Proposition 2: There exist exogenous parameter values such that the conjectured equilibrium is a sequential equilibrium. In this sequential equilibrium, both H and L choose an ambiguous contract in the first period.

Proof: See Appendix.

The game we have modeled has one other sequential equilibrium in pure strategies,[9] one in which both types choose a precise contract at t = 1. It is straightforward to verify, however, that H strictly prefers the equilibrium specified in Proposition 2 if the rents from information reusability exceed some lower bound (for a formal proof, see the second part of the proof of Proposition 2). Moreover, this sequential equilibrium is also the one in which social surplus is maximized.

Some of the salient features of this equilibrium are as follows. First, on average there is greater default on ambiguous contracts than on precise contracts by the same intermediary. Second, the fees charged on ambiguous contracts are lower than those charged on precise contracts by the

same intermediary. Third, across intermediaries with different reputations, fees on ambiguous contracts need not be lower than those on precise contracts. This is because the likelihood of default on an ambiguous contract by an intermediary with a very good reputation may be no higher than the likelihood of default on a precise contract by an intermediary with a poorer reputation. Fourth, the fee charged by the intermediary is increasing in its reputation, and the difference in fees on a given contract across intermediaries with different reputations is greater for an ambiguous contract than for a precise contract.

It is worth noting that we have chosen to focus on exogenous parameter values such that type H honors an ambiguous contract in the positive resource state, $\bar{C}$, and type L does not. The general result is that type H always has a stronger incentive than type L to honor an ambiguous contract. However, there may be exogenous parameter values for which both types will honor an ambiguous contract if their resources are sufficient, or neither type ever honors an ambiguous contract. We consider the latter possibility of little importance because extending the number of time periods will generally induce type H, and possibly also type L, to value reputation sufficiently to honor the ambiguous contract.

C. Interpretation

An ambiguous contract is more costly to H than a precise contract in the absence of reputational considerations because H is pooled with L who always defaults on an ambiguous contract. Hence, H earns a lower fee than he would in the absence of L. The cost this imposes on H is offset by two benefits of the ambiguous contract. One is that H can reduce his expected

financial liability with an ambiguous contract by defaulting in the states in which he is financially impaired. This prevents the loss of reusable information as well as financial capital. The second is that an ambiguous contract enables H to more effectively develop a reputation, since the ambiguous contract leads to a higher probability of realizing a state in which H honors the contract and L does not. Better reputation results in increased fee income. Thus, one can expect an ambiguous contract to be preferred when the tension between the short and the long run favors the latter.

Ambiguity enhances discretion by permitting the guarantor to default in states where honoring a claim is too costly. The guarantor thereby substitutes reputation for financial capital in discharging a claim. More specifically, financial losses that threaten solvency can jeopardize reusable information as well as reputational capital. Defaulting on such a claim preserves the informational asset as well as the financial capital, and the firm endures to serve at least for one more period.

Ambiguity aids reputation enhancement by facilitating the separation of high and low types. Note, too, that the purchaser of a guarantee will not enter into an ambiguous contract with a guarantor devoid of reputation, i.e., with $\Psi_0 = 0$ at $t = 0$. Thus, ambiguous contracts are predictably the stock-in-trade of institutions with reputational capital at the outset. This may explain why financial institutions seem to be especially active in writing ambiguous guarantees. Primitive intermediaries were brokers across costly-to-observe attributes where reputation is especially important. It would seem natural for such brokers to enter the market for ambiguous guarantees. Indeed, the theory predicts that whenever reputational capital

is important there will be an inclination to write ambiguous guarantees, if only to facilitate the management of the firm's assets.

4. Some Examples

A. Mutual Fund Contracts

Managers of investment funds, such as the Dutch property investment fund discussed in the Introduction, sometimes have ambiguous contracts with their customers. Although it was not legally obliged to provide price support, it engaged in a voluntary share buyback program for many years to build up its reputational capital. However, when negative sentiment among its investors led to a massive supply of its shares, it faced the prospect of a substantial impairment of its financial capital if it continued this practice, and thus chose to invoke its legal right to not honor the contract. This interplay between reputational and financial capital would not have been possible with a precise contract that would stipulate price support.[10]

Implicit price support for mutual funds has also been provided by U.S. money fund managers. For example, in 1989, financial-services giant Integrated Resources, Inc. defaulted on nearly $1 billion of commercial paper and, in March 1990, Mortgage & Realty Trust defaulted on $167 million of commercial paper. Rather than see their investors lose money, money market fund companies on both occasions absorbed the losses themselves by buying the defaulted commercial paper held by their money funds.[11] Clearly, there was no legal obligation for them to do so, but such actions were motivated by the desire to continue the price guarantee <u>implicit</u> in investors' beliefs that the money fund share price will not fall below $1.[12]

It is also reasonable to assume that these fund companies will abandon this practice if continuing with it becomes prohibitively costly.[13]

B. The Loan Commitment

Bank loan commitments are notable for their "nervous" or "escape" clauses. These permit the commitment to be voided in the sole discretion of the obligor if there is "material deterioration" in the financial condition of the commitment owner. Material deterioration is typically left undefined and, apart from questionable legal remedies, there is rarely any provision for third-party adjudication of disputes.

Arguably, the ambiguity incorporated into the loan commitment is remediable at less than prohibitive cost. The covenants in loan contracts are typically well specified, and the stand-by letter of credit, a companion contract to the loan commitment, incorporates no analogous ambiguity. Letters of credit are legally binding and payable upon presentation of documents. These arguments suggest that the ambiguity in loan commitment contracts is constructive. Along the lines suggested by our theory, the institution's desire to jointly manage its reputational and financial capital may explain the observed ambiguity.

C. Highly Confident Letters

Highly confident letters are in many respects similar to loan commitments. These are typically sold by investment bankers to customers concerned with demonstrating their ability to borrow for the purpose of persuading a potential seller of assets of the seriousness of a purchase offer. The highly confident letter should be viewed as a weak-form

alternative to the bridge loan.

A recent example of the ambiguous nature of the highly confident letter was illustrated by the October 1989 proposed buyout of UAL. Citicorp and Chase Manhattan Corp. jointly agreed to commit $3 billion to the buyout and further indicated they were "highly confident" they could provide an additional $4.2 billion from the lenders. The two banks were paid combined fees of $8 million for the commitments. The deal was predicated on the banks being able to arrange credit of $7.2 billion. The deal fell through, however, when other banks withdrew after initial indications of interest.[14]

C. Holding Company Cross-Guarantees

Financial holding companies labor to maintain legal separation among their subsidiaries while simultaneously trying to persuade trading partners that the holding company is a source of strength to all its members. If these latter representations are too explicit, however, the legal separation is jeopardized. Thus, marketing often stresses filial relationships among holding company members, but explicit cross-guarantees are studiously eschewed. However, holding companies rarely discourage the belief in such cross-guarantees.[15] Indeed, the public is subtly led to believe that the company would come to the assistance of operating units in distress. This belief is given credence by the Federal Reserve's representations that the holding company should be a "source of strength" to its members, rather than being merely an agglomeration of legally linked operating units.

Another related application is project financing that is popular for large, relatively risky projects (see Shah and Thakor (1987)). The project is separately incorporated and the financing is often with non-recourse

debt. If the subsidiary is unable to service the debt, the parent company is not legally exposed. At its discretion, the parent may service the debt to retain ownership of the project, and the contractual ambiguity created by this option of the parent is presumably internalized by creditors.

E. Other Examples

Our model is also applicable to understanding the type of contract used by investment bankers to raise capital. A "firm commitment" underwriting contract is precise relative to the "best efforts" contract. Success in raising the necessary capital with the latter contract should, according to our model, have a greater positive effect on the underwriter's reputation.

We believe that there are many other examples where ambiguity can be found and understood within the context of our model.[16]

5. Conclusion

We have developed a theory of ambiguous financial contracting. The basic insight is that even when contingencies can be explicitly stipulated in a legally enforceable manner, contracting parties may choose to leave terms ambiguous. Contractual ambiguity offers two advantages. First, the obligor can choose to default in a state in which reputational capital is optimally sacrificed in order to preserve financial capital and information reusability. This provides the obligor with a cost-reducing opportunity, and therefore promotes efficiency. The sacrifice of reputation is dissipative, however, whereas the cash settlement of a claim is merely redistributive. But the dissipative sacrifice of reputation preserves the reusability of information which presumably would be lost in insolvency.

Second, the ambiguous contract facilitates reputation enhancement which augments the contracting surplus in subsequent time periods.

The theory also provides a new perspective on reputation models. These models typically take the contract as given, and then examine incentives for reputation development (Kreps and Wilson (1982b)). We show that ambiguity enhances the potential for reputation development. Hence, better agents may choose ambiguous contracts in order to facilitate reputation development.

The empirical predictions of our theory are as follows.

1. On average, the ambiguous contracts in an intermediary's portfolio, as a fraction of its initial contracts, will be increasing in the intermediary's reputation.
2. There is greater default on ambiguous contracts than on precise contracts by the same intermediary.
3. Fees for ambiguous contracts should be lower than for otherwise similar precise contracts sold by the same intermediary.
4. Across intermediaries with different reputations, fees on ambiguous contracts need not be lower than those on precise contracts.
5. The fee charged by the intermediary is increasing in its reputation, and the difference in fees on a given contract across two intermediaries with different reputations is greater for an ambiguous contract than for a precise contract.

It should be possible to test some of these predictions. Data on brokers such as underwriters are available, along with measures of underwriter reputation (Hayes (1971)).[17] Moreover, underwriters employ a variety of contracts with differing degrees of precision.

While we have focused on the reputational aspect of contractual ambiguity, clearly, constructive ambiguity has a variety of explanations and ours will vary in importance across the variety of financial contracts displaying ambiguity. For example, we expect the moral hazard explanation to be relatively important in contracts between the government and deposit institutions and relatively less important in contracts between depository institutions and their various private-sector clienteles.

Although applicable in a wide variety of situations involving illiquid reputational capital, we have chosen financial intermediaries to illustrate our theory of ambiguity. The theory suggests a new way of thinking about the evolution of brokers into guarantors offering a wider range of financial intermediation services.

Notes

1. This approach seems inappropriate to explain the kind of contractual ambiguity we seek to explain in, for example, loan commitments. The same banks that write loan commitments also offer standby letters of credit, a similar contract without the noted ambiguity. Moreover, loan contracts include covenants that clearly specify the conditions under which the contract is "accelerated." Thus, it strains credulity to explain the imprecision of loan commitments, for example, on the ground that greater specificity would entail prohibitive costs. Moreover, were this an issue of complexity alone, it would seem more plausible to have the integrity of the commitment adjudicated by an objective third party, rather than the obligor.

2. The moral hazard argument seems relevant for explaining the government's refusal to explicitly guarantee deposits in excess of $100,000 per account and the vagueness of conditions precedent to access to lender of last resort facilities, among both the Federal Reserve and the Federal Home Loan Bank Systems. Such ambiguity may encourage banks to take greater care in underwriting and asset selection. Although this moral hazard explanation for ambiguity seems to fit in the cases of government safety-net guarantees, its applicability in the case of loan commitments or highly confident letters is less than obvious.

3. The implicit contracting literature has addressed issues different from those we examine. In Aziardis (1975), implicit contracts are adopted for risk sharing reasons, whereas in Akerlof (1982) implicit contracts take the form of partial gift exchange between employees and firms. In Stein (1989). It is argued there that the Federal Reserve makes imprecise policy announcements because precise announcements are not credible

4. We assume that the value of X's financial capital is not mutually verifiable, so that if X defaults on a precise contract when he has financial capital exceeding his obligation to Y, he surrenders to Y more than he would by settling the claim.

5. Even with a precise contract, it is important for Y to know which type of X it is dealing with, since financial impairment (and, hence, the inability to honor even a precise contract) is more likely for type L than for type H.

6. The decision to honor an ambiguous contract is perfectly revealing since a type L agent never does. Hence, the resulting posterior of the market at $t = 1$ is that X is of type H with probability one.

7. In the specification of beliefs we have fixed the contract choice. The derivation of the sequential equilibrium in the ensuing analysis is more general and allows X to choose between ambiguous and precise

contracts. This choice is a strategic move by X, which might affect Y's beliefs.

8. Indeed, it is this promise of positive profits in the future that induces H to honor an ambiguous contract.

9. There may be other sequential equilibria in mixed strategies. Moreover, we do not examine the signaling potential of the fees charged by X that may permit perfect separation of types H and L at the outset. Of course, doing this would require relaxing the period-by-period zero profit constraint, which we do not consider reasonable.

10. The information available on the Robeco case suggests very strongly that the company's strategies have been driven by reputational considerations. For example, we quote from an article entitled, "Robeco Invests Heavily in Limiting Reputation Damage," in the Financial Times, October 2, 1990: "In the wake of the Rodamco about-face on share buying, Ronald van de Krol finds the Dutch property fund's owner busily reassuring shareholders that its share and bond funds will remain open-ended." A look at Rodamco's share prices from 09/20/90 through 10/23/90 reveals a steady drop of 27 percent during this period. Our data indicate that the "standard" closed-end fund discount can only partially explain this price reduction.

11. See the Wall Street Journal (WSJ), October 22, 1990.

12. Ibid., October 22, 1990: "Money funds are designed to keep a stable share price, typically $1. Many investors assume the $1 share price is guaranteed, and that money funds are as safe as a bank certificate of deposit or checking account."

13. Ibid., October 22, 1990: "However, fund managers fear that as the economy weakens, more commercial paper defaults lie ahead; and next time it happens, fund managers may not be able to eat the loss."

14. See the Wall Street Journal, October 16, 1989.

15. In a parent/subsidiary relationship, the parent often provides a "comfort letter" to satisfy the lender's need for assurance from a solvent parent for credit to be extended to the parent's subsidiary. The use of comfort letters is common practice, and their contents have become increasingly detailed and standardized up to the point where enforceability in court appeared to be possible. However, recently the British high court ruled that letters of comfort represent solely a moral commitment (American Banker, June 6, 1989). This ruling reversed an earlier ruling by a lower court (Sacasas (1989)).

16. To some extent, preferred stock may be viewed as an ambiguous version of the more precise debt contract. The firm "promises" a particular dividend payment on the preferred stock, but cannot be driven to bankruptcy if it does not make this payment. As such, we would expect a preferred stock dividend payment to have greater reputational effects.

17. See Carter and Manaster (1990) for an empirical study of IPO pricing and underwriter reputation.

Appendix

Proof of Proposition 1: We adopt the usual dynamic programming approach and solve this model backwards, starting with t = 2 (the beginning of the third period). Since the first period contract in the conjectured equilibrium is ambiguous, X enters the third period with reputation $\psi_2^A = \psi_2^A(H|\Omega_2))$. In the third period, X can charge the following fee for the guarantee

$$f_2^P(\psi_2^A) = q[\psi_2^A p_H + (1 - \psi_2^A)p_L]M. \tag{10}$$

A new intermediary with a reputation of $\psi_0 = \gamma$ would be able to charge a guarantee fee of

$$f_2^P(\gamma) = q[\gamma p_H + (1 - \gamma)p_L]M. \tag{11}$$

For the new intermediary of type H to participate, it should receive a brokerage fee of

$$\phi_2^P(\gamma) = qp_H M - f_2^P(\gamma) + \bar{V}, \tag{12}$$

where $qp_H M$ is the expected liability on the guarantee for the type H intermediary, $f_2^P(\gamma)$ is the actual compensation received for providing the guarantee (hence, $qp_H M - f_2^P(\gamma)$ is a new H's expected loss on the guarantee), and $\bar{V}$ is the information production cost. Thus, the brokerage fee is set such that H's overall participation constraint is just met. Define $F_i(\psi_t)$ as the net rent earned by the type $i \in \{L,H\}$ intermediary in period t with

reputation ψ_t. Now, if H enters the third period with a reputation of ψ_2^A, he earns a net rent of

$$(13) \qquad F_H(\psi_2^A) = f_2^P(\psi_2^A) + \phi_2^P(\gamma) - \bar{V}^* - qp_HM.$$

Substituting (12) in (13), and taking into account (10) and (11), yields

$$(14) \qquad F_H(\psi_2^A) = [\psi_2^A - \gamma][p_H - p_L]qM + \bar{V} - \bar{V}^*.$$

Similarly, for L we have

$$(15) \qquad F_L(\psi_2^A) = [\psi_2^A - \gamma][p_H - p_L]qM + \bar{V} - \bar{V}^* + q[p_H - p_L]M.$$

We now analyze the second-period solution. Using steps similar to those for the third period, we can write

$$(16) \qquad F_H(\psi_1^A) = [\psi_1^A - \gamma][p_H - p_L]qM + \bar{V} - \bar{V}^*$$

$$(17) \qquad F_L(\psi_1^A) = [\psi_1^A - \gamma][p_H - p_L]qM + \bar{V} - \bar{V}^* + q[p_H - p_L]M$$

We now move on to the first period. Both H and L start out with a reputation γ. We want to show that if state $\bar{C}$ is realized at the end of the first period, H will honor the ambiguous first-period contract and L will not. H will honor the contract at t = 1 if the loss in his financial capital from honoring, M, is less than the monetary value of honoring, which is the difference between his expected future rents associated with honoring

and defaulting now. That is, H honors his contract if

$$(18)\quad M < F_H(\psi_1^A(H|h_1)) + qp_HF_H(\psi_2^A(H|h_1,h_2)) + [1-q]F_H(\psi_2^A(H|h_1,n_2)) - [F_H(\psi_1^A(H|d_1)) + qp_HF_H(\psi_2^A(H|d_1,h_2)) + [1-q]F_H(\psi_2^A(H|d_1,n_2))]$$

Similarly, L will chose to default in state $\bar{C}$ if

$$(19)\quad M > F_L(\psi_1^A(H|h_1)) + qp_LF_L(\psi_2^A(H|h_1,h_2)) + [1-q]F_L(\psi_2^A(H|h_1,n_2)) - [F_L(\psi_1^A(H|d_1)) + qp_LF_L(\psi_2^A(H|d_1,h_2)) + [1-q]F_L(\psi_2^A(H|d_1,n_2))]$$

Substituting (14) through (17) into (18) and (19) allows us to write the following expressions:

$$(20)\quad \begin{aligned} M < {} & q[p_H - p_L]M[\psi_1^A(H|h_1) - \psi_1^A(H|d_1)] \\ & + q^2p_H[p_H - p_L]M[\psi_2^A(H|h_1,h_2) - \psi_2^A(H|d_1,h_2)] \\ & + [1-q]q[p_H - p_L]M[\psi_2^A(H|h_1,n_2) - \psi_2^A(H|d_1,n_2)] \end{aligned}$$

and

$$(21)\quad \begin{aligned} M > {} & q[p_H - p_L]M[\psi_1^A(H|h_1) - \psi_1^A(H|d_1)] \\ & + q^2p_L(p_H - p_L]M[\psi_2^A(H|h_1,h_2) - \psi_2^A(H|d_1,h_2)] \\ & + [1-q]q[p_H - p_L]M[\psi_2^A(H|h_1,n_2) - \psi_2^A(H|d_1,n_2)] \end{aligned}$$

We see that the right side (RHS) in (20) exceeds the RHS in (21). Hence, (20) and (21) can hold simultaneously, and a sufficient condition is that (9) holds. Q.E.D.

Proof of Proposition 2: Initially, fix the contract choice in the first period to be an ambiguous contract. Given that condition (9) holds, X will follow the conjectured first period strategy in state $\bar{C}$, as given in Table 2. Condition (9) guarantees that H and L do not envy each other's conjectured equilibrium strategies. In state $\underline{C}$, the strategy choice is fixed by construction. The second and third period contracts are precise, and the strategy choices are again fixed by construction. As outlined earlier, the choice between a precise and an ambiguous contract is strategic. Thus, choosing a precise contract at t = 0 is an out-of-equilibrium (o.o.e.) move. No other o.o.e. moves exist. Define $\mu(H|P)$ as the market's belief, i.e., the probability that the defector is type H given the o.o.e. move P (choosing a precise contract). It follows that for $\mu(H|P)$ sufficiently small, neither type will defect. Take, for instance, $\mu(H|P) = 0$, then $\psi_1^P(\text{defection}) = \psi_2^P(\text{defection}) = 0$. Therefore, contracting, if possible, will produce negative rents. This proves that the conjectured equilibrium is a sequential equilibrium.

The alternative sequential equilibrium involves both L and H choosing a precise contract in the first period. Now strategies for time points t = 2 and t =3 are those specified in Table 2. Choosing an ambiguous contract is now an o.o.e. move. But with the belief $\mu(H|A) = 0$, the sequential equilibrium can be sustained.

We will now establish that the sequential equilibrium stated in the proposition is preferred by H if rents from information reusability exceed some (as yet unspecified) lower bound. The sufficiency condition is that the intertemporal rents from choosing the ambiguous contract in the first

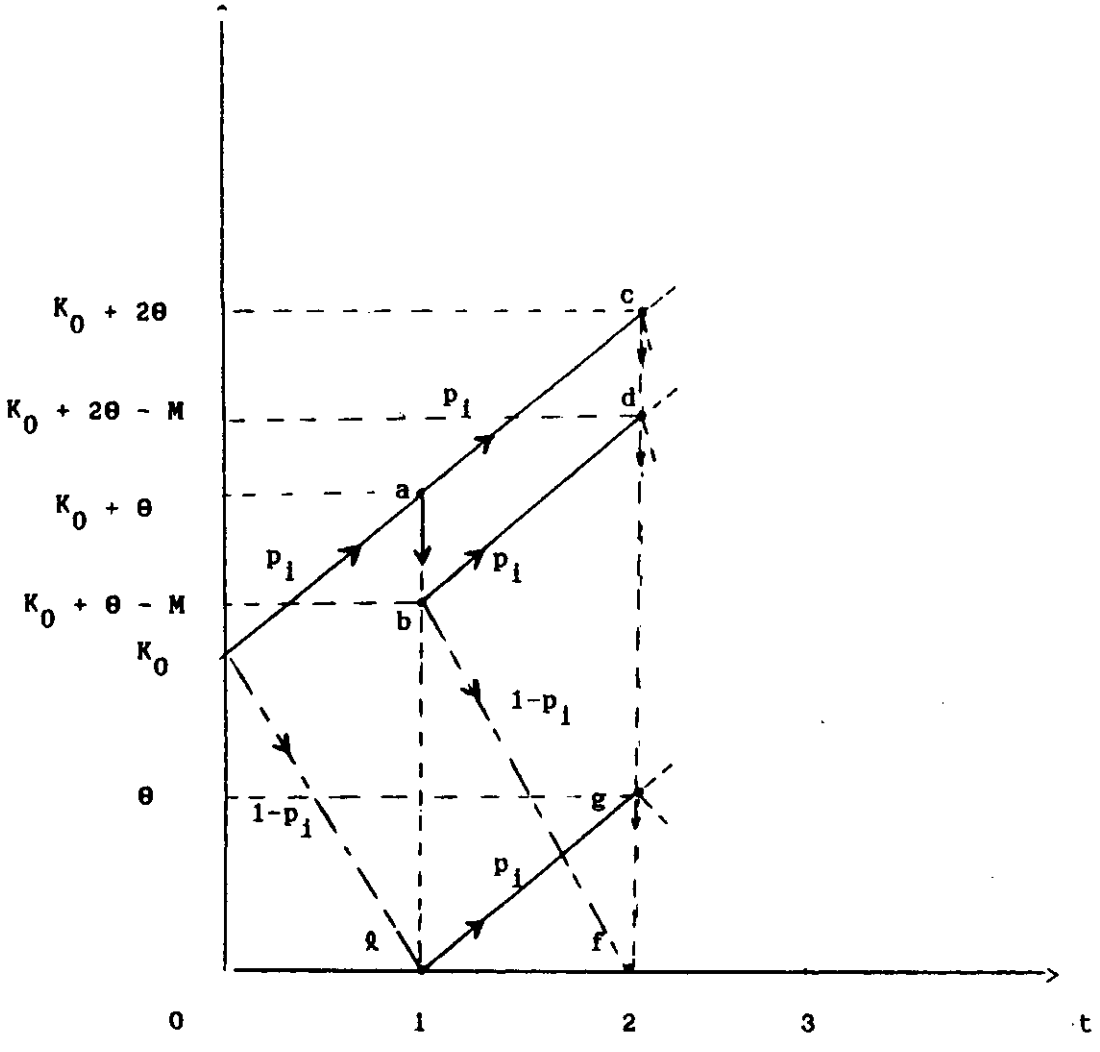
period should exceed those attainable with a precise contract in the first period, i.e.,

$$
\begin{aligned}
&[1 - q]\{F_H(\psi_1^A(H|n_1)) + [1 - q]F_H(\psi_2^A(H|n_1,n_2)) + qp_HF_H(\psi_2^A(H|n_1,h_2))\} \\
&+ qp_H\{F_H(\psi_1^A(H|h_1)) + [1 - q]F_H(\psi_2^A(H|h_1,n_2)) + qp_HF_H(\psi_2^A(H|h_1,h_2))\} \\
&+ q[1 - p_H]\{F_H(\psi_1^A(H|d_1)) + [1 - q]F_H(\psi_2^A(H|d_1,n_2)) + qp_HF_H(\psi_2^A(H|d_1,h_2))\} \\
&> \qquad (22) \\
&[1 - q]\{F_H(\psi_1^P(H|n_1)) + [1 - q]F_H(\psi_2^P(H|n_1,n_2)) + qp_HF_H(\psi_2^P(H|n_1,h_2))\} \\
&+ qp_H\{F_H(\psi_1^P(H|h_1)) + [1 - q]F_H(\psi_2^P(H|h_1,n_2)) + qp_HF_H(\psi_2^P(H|h_1,h_2))\}
\end{aligned}
$$

In these expressions we have used the fact that default at any point terminates the intermediary. The next step is to substitute (5), (6), (14) and (16) in (22). It can be shown that the rate at which the left side of (22) increases in $\bar{V} - \bar{V}^*$ is strictly greater than the rate at which the right side increases in $\bar{V} - \bar{V}^*$. This proves that, for a sufficiently large information reusability advantage, the sequential equilibrium with ambiguous first-period contracting dominates the other sequential equilibrium.

Q.E.D.

Figure 1: Evolution of Capital, Some Examples



Note:

(a) k_0ac: capital growth in period one and two, no claim at t = 1;

(b) $k_0\ell g$: capital depletes in period one; it grows in second period (feasibility requires either an ambiguous contract in the first period, and/or no claim in that period).

(c) Various other paths are possible.

Law Journal, March-April 1989, 173-182.

Shah, S. and A. V. Thakor, "Optimal Capital Structure and Project Financing," Journal of Economic Theory, 42, 1987, 209-243.

Stein, J. C., "Cheap Talk and the Fed: A Theory of Imprecise Policy Announcements," The American Economic Review, 79, 1989, 32-42.

Williamson, O., Markets and Hierarchies: Analysis and Anti-Trust Implications: A Study in the Economics of Internal Organization, 1975.

References

Akerof, G. A., "Labor Contracts as Partial Gift Exchange," Quarterly Journal of Economics, XCVII-4, November 1982, 543-69.

Azariadis, C., "Implicit Contracts and Unemployment Equilibria," Journal of Political Economy, LXXXIII, December 1975, 1183-1202.

Boot, A. and A. V. Thakor, "Ambiguity and Moral Hazard," Working Paper, Indiana University, August 1990.

Bull, C., "The Existence of Self-Enforcing Implicit Contracts," Quarterly Journal of Economics, 1987.

Chan, Y., S. I. Greenbaum and A. V. Thakor, "Information Reusability, Competition and Bank Asset Quality," Journal of Banking and Finance, 10, 1986, 243-253.

Carter, R. and S. Manaster, "Initial Public Offerings and Underwriter Reputation," The Journal of Finance, XLV-4, September 1990, 1045-1067.

Hadfield, G, "Problematic Relations: Franchising and the Law of Incomplete Contracts," mimeo, Stanford University, 1988.

Hart, O. and J. Moore, "Incomplete Contracts and Renegotiation," Econometrica, 56, July 1988, 755-785.

Hayes, S., "Investment Banking: Power Structure in Flux," Harvard Business Review, 49, 1971, 136-152.

Kreps, D. M. and R. Wilson, "Sequential Equilibrium," Econometrica, 50, July 1982a, 863-94.

Kreps, D. M. and R. Wilson, "Reputation and Imperfect Information," Journal of Economic Theory, 27, 1982b, 863-894.

Sacasas, R., "The Comfort Letter Trap: Parent Companies Beware," Banking