

Organizational Form Coexistence: stock and mutual financial firms*

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DRAFT

Abstract

Customer owned mutual firms and investor owned stock firms have long coexisted in the financial sector. The global, multi-industry, and long term nature of the coexistence indicates stability. Outside the financial sector, stock firms dominate and mutual companies are rare. Relative to stock firms, mutuals have higher expenses, lower risk, and larger size.

This work offers the first joint explanation of these facts. It employs an equilibrium model of stock and mutual financial firms. The model features competitive markets for labor, equity, and product. Organizational form, size, risk, expenses, and product price are endogenous. The product price is an endogenous function of firm default risk. In mutual firms managers make all decisions, while in stock firms both managers and owners make decisions. In mutuals, the ownership claim and the customer claim are inseparable. In equilibrium, mutual firms sell high priced, low risk products to customers with high risk aversions. Stock firms sell low priced, high risk products to customers with low risk aversions.

Recent demutualization activity in the life insurance industry is discussed.

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1 Introduction

The defining characteristic of mutual firms is customer ownership. The ownership and customer roles are inextricably linked. Separating and transferring ownership claims is impossible. Therefore both the managerial oversight and the low financing costs associated with an active secondary market are absent. Hence, the mutual organizational form looks *prima facie* inferior to the stock corporation. The mutual corporate form is viable, however, and survives in several industries, world-wide, and over long periods of time.

Mutuals dominate the fund industry.² ³ The mutual and stock organizational forms coexist in insurance and banking.⁴ The mutual corporate form is not a significant presence outside the financial sector.

For mutual and stock companies competing in the same product market, several features consistently emerge from a rich empirical literature. Mutuals have lower risk than their stock counterparts. The comparison holds for asset risk, liability risk, leverage, and default risk (both expected and observed). Also mutual firms have higher expenses than stock firms. Mutual customers are more risk averse than stock customers.

In stark contrast to the rich empirical literature on coexisting stock and mutual firms, the theory literature contains of relatively few analyses, and lacks a formal model. This work employs an equilibrium model to study the two organizational forms, and answer the following questions. What accounts for the mutual organizational form's viability despite the lack of managerial oversight and despite high financing costs? Under what conditions will the mutual form dominate, coexist with, or be dominated by, the stock form? What accounts for the relative features of stock and mutual companies when both compete in the same product market? Why is the mutual form only significant in the financial sector?

A secondary objective of this work is to consider organizational form changes. Firms may change form, and organizational forms may evolve. Both types of changes are paramount in the global life insurance industry today. Current *demutualization*

²Morningstar reports that the mutual corporate form, i.e., open-end funds, accounted for 96.5% of industry assets, as of January, 1, 1999.

³*Closed-end mutual fund* is a misnomer. Only open-end funds are mutual companies, and therefore mutual funds. Closed-end funds are investment funds organized as stock companies.

⁴Mutuals account for 31% of life insurer assets (1997, A.M. Best Co.) 21% of property-liability insurer assets(1997, A.M. Best Co.), 31% of savings and loan association, a.k.a. Thrift assets (1998, Office of Thrift Supervision), and 4% of savings bank assets (1998, OTS).

activity levels are unprecedented, as mutual managers change their companies to stock firms. Additionally, a new and controversial form has emerged, the mutual holding company (MHC). Again this is a global phenomenon. The results here are relevant to both changes, since they delineate conditions under which mutual organization is more and less desirable.

Since stock and mutual firms do coexist in several financial industries, many countries (with differing regulatory regimes), and over long time periods, the actual coexistence is very stable. Partial equilibrium analysis, however, supports only knife-edge coexistence. The same is true for any posited tension involving a single advantage of each form (and of course implying an additional disadvantage). In contrast, the equilibrium approach yields a coexistence that obtains for a range of parameter values, and is stable. This emphasizes the importance of studying the viability of organizational forms, and specifically the questions here, in an equilibrium context.

The setting includes three competitive markets, and three types of rational agents. The competitive markets are managerial labor, product, and equity. The rational agents are managers, customers, and shareholders. Managers choose a corporate form from which to compete for customers in the product market. All economic surplus accrues to customers in equilibrium. Customers have different risk aversions. The endogenous product demand schedule decreases in firm default risk. Managers are identical. They like salary, and dislike default risk and effort. Effort reduces operating (non-financing) expenses and is not contractible. Owners supply equity for fair returns. Endogenous variables are asset risk, default risk, price, effort, salary, equity infusion, and firm size.⁵

When the two modeled organizational forms coexist in equilibrium, mutual firms sell high priced low risk products to customers with high risk aversions. Stock firms sell low priced high risk products to customers with low risk aversions. The model generates relative levels of default risk, asset risk, operating expense, and customer risk aversion which accord with empirically established facts for coexisting stock and mutual financial firms. It also produces new empirical implications. Additional testable hypotheses follow. Mutual firms have higher costs of capital than stock firms. Mutual product prices are lower than those of stock firms. Stock firms employ more technology and less human labor than mutual firms do. Financial product

⁵Exogenous financial market prices of risk and liquidity, and an assumed manager reservation utility, makes the equilibrium here less than fully general. The endogenous product price schedule, however, makes it something more than partial.

customers value financial firm safety more than non-financial product customers value non-financial firm safety. Mortgage customers of mutual deposit institutions pay higher prices than do mortgage customers of stock deposit institutions.

Organizational form theory primarily focuses on agency issues, which arise from the separation of ownership and control. Agency issues are present here; both forms have agency costs. Capital issues, however, are central to the analysis. One is capital divisibility. Managers of mutual firms, who are the decision makers, must supply all their human capital to exactly one firm. Their optimization therefore entails maximizing total utility from the firm. This is in contrast to the stock form where shareholders influence managerial decisions. Since financial capital of stock firms is infinitely divisible, shareholders aim to maximize the per unit return on their equity contribution. Capital divisibility affects size and operating efficiency, since effort exhibits decreasing returns to scale and to size. The mutual firm is large, in line with the aggregate maximization. The stock firm has low unit operating expenses, in line with the maximization of unit values.

The modeled mutual organization has no managerial oversight from owners. Therefore risk averse managers choose zero risk. Their effort level balances disutility of effort and utility of taking the resulting expense savings, as salary. The form's deadweight cost, relative to the first best case, has two components. One arises from a size choice that maximizes manager utility, to the detriment of unit customer price. The second is the aforementioned liquidity cost.

Stock organizations receive explicit managerial oversight, modeled here as a compensation contract involving asset risk and salary. Shareholders determine asset risk, salary, and equity infusion. Shareholders always choose positive firm risk, but for reasons other than the standard risk shifting argument of corporate finance (Jensen and Meckling, 1979; Galais and Masulis, 1976; Green, 1984). If the manager's choice of effort and choice of size (i.e., volume of sales) were contractible, shareholders would prefer a riskless firm. With risk, the decrease in product price outweighs the increase in share value. Shareholders employ asset risk to motivate the manager to make effort, which reduces expenses. Risk averse managers exert effort in order to reduce the resulting default risk. Since asset risk, salary, and equity infusion are chosen by the shareholders, expense reduction through effort is the stock manager's only tool for reducing default risk. The effort level balances disutility of effort and disutility of default risk. Residual risk always remains after expense reduction. It is the indirect choice of shareholders. Shareholders do not choose infinite firm risk because along with the direct effect of raising equity value, risk also increases man-

ager compensation and decreases product price. A unit based compensation scheme exactly aligns the manager and shareholders with regards to size.

The stock form's deadweight cost, relative to the first best case, is deadweight associated with positive risk: decreased premium, and increased salary. It consists of salary attributable to default risk, and of a price reduction in excess of the benefit reduction.

The theory of the firm underlying this work, considers the firm a nexus of explicit and implicit contracts. The mutual organizational form is an implicit contract that aligns risk averse managers with risk averse customers. Therein lies its value. The value of mutual equity does not arise from the typically unused control rights it confers on customers. The value arises from the absence of control rights conferred on investors.

Managers make all decisions in mutual organizations. Unconstrained, the managers choose zero asset and default risk. The demand schedule does not constrain the manager w.r.t. the manager's preferences, because customers also value low risk. No explicit contract aligns managers and customers. They are aligned by their common risk aversion. Effort reduces expenses and increases salary. That is, mutual managers take home expense savings as salary. The effort level balances disutility of effort and utility of salary.

The type of mutual considered here is the so-called "Modern Mutual," where customers are a heterogeneous group, not an association sharing a common bond. The term, "Modern Mutual," arose to describe the evolved form of mutual insurers who first served a homogenous customer base and later served a heterogeneous one. The term is misleading because mutuals with heterogeneous customers are neither strictly a modern phenomenon nor the only type seen in the modern era. Credit unions, by charter, require a "common bond" between customers. Securities exchanges, agricultural cooperatives, and some specialized medical malpractice insurers are also modern versions of non-Modern mutuals. To focus on the issue of viability of an organizational form with little managerial oversight, the association type of mutuals are excluded. They lack the high cost of collective action that would seem to render mutuals obsolete when exposed to competition from the stock form. Practically speaking, the mutuals studied here are mutual savings banks, mutual savings and loan associations (which in an earlier era were association type mutuals), mutual insurers, excluding the aforementioned small specialty insurers, and mutual funds. The era to which this model is relevant is the modern one. Although

somewhat arbitrary, 1910 is a reasonable starting date.⁶

The modeled firm is described in terms of the archetypal intermediary, an insurance company, strictly for expository convenience. Section 5 describes alterations necessary to render the model appropriate for other intermediaries and non-intermediaries. The issues are the same, but the particulars of liabilities and assets for each type of firm differ.

The paper is organized as follows. Section 2 reviews related work. Section 3 describes and discusses the model. Section 4 describes equilibrium and related results. Section 5 describes changes and results for both non-insurance intermediaries and non-intermediaries. Section 6 discusses implications relevant to current demutualization phenomena. Section 7 concludes. Proofs of all propositions appear in the appendix.

2 Literature Review

Hansmann (1985, 1989) thoroughly describes and analyzes various ownership forms, underlining the importance of managerial incentives, agency costs, and product market competition.

Fama and Jensen (1983a, 1983b, 1985) address the following questions, also considered here. Why do mutuals only appear in the financial sector? How do they coexist with the stock form? Their first answer relies on the financial customer's ability to affect assets under managerial control and thereby discipline management. The second answer relies on the redeemable nature of the mutual claim.

Their cogent arguments rationalize the dominance of the mutual form in investment funds. The analysis is less satisfying for banks and insurers, where mortgagees and policyholders face high transaction costs. As Fama and Jensen (1985) makes clear, the ability to redeem claims, even at a cost, enables management discipline. A high cost to the customer of making such transactions, however, limits their use and leaves more "wobble room" for mutual managers relative to stock managers in such markets.

Following Jensen and Meckling (1976), Mayers and Smith (1981) consider coex-

⁶During the progressive era at the turn of the century, US stock managers came under scrutiny. Perceived excesses led to reforms that increased visibility and monitoring of stock firm managements. In fact, some stock managers arranged to change their corporate form to mutual following investigation (e.g., Prudential, Equitable, and Metropolitan life insurance companies). This suggests that managers were, for the first time, more constrained in the stock form than the mutual.

istence of the mutual and stock forms in the insurance industry in terms of agency costs. The *Management Discretion Hypothesis* describes disadvantages of the stock and mutual forms which can offset each other and allow coexistence in equilibrium. The disadvantage of the stock form is conflict between policyholders and shareholders. The disadvantage of the mutual form is absent managerial oversight. Empirical support for the hypothesis is mixed (Kroll et al., 1993; Mayers and Smith 1981, 1986, 1988, 1992, 1994; Pottier and Sommer, 1997) and subject to other interpretations (Hansmann 1985, 1989, 1996; Smith and Stutzer 1990, 1995).

Smith and Stutzer (1995) consider mutuals as purveyors of participating policies. Such policies have risk sharing features when loss risk exists at the firm level. The model explains the historical formation of mutual companies in view of an era's estimation risk and moral hazard.

An branch of insurance research is easily mistaken for organizational form work. It uses *mutual* and *stock* as shorthand for participating⁷ and non-participating contracts, and studies the viability of multiple versions of insurance contracts. The confusing semantics arise from a strong association between corporate form and type of insurance contract sold. Close reading reveals the policy question as the one formally addressed (e.g., Doherty, 1991).

Organizational form work has long emphasized agency costs and risk sharing. In competitive markets, however, agency costs are hard to sustain. Amelioration of agency costs by one firm, then threatens the survival of other firms. Since organizational form literature emphasizes agency costs, readers may conclude organizational form is irrelevant in competitive settings. It is not. The capital issues of divisibility and liquidity, along with agent preferences for risk vary with organizational form. These can have an impact on firm characteristics even in competitive product markets.

Existing organizational form analysis generally ignores Capital issues. An exception is Winton (1993) where liquidity plays a prominent role. The work shows that contingent liability structures, as for example Lloyd's organizations, dominate a structure with contributed capital and limited liability when investor wealth is illiquid and ownership claims are not transferable. The non-tradability of ownership claims allows contingent liability schemes (where the owner is liable for more than the initial contribution) to save on monitoring costs. With nontransferable ownership, only the wealth of the original owner requires investigation. The risk of

⁷Participation in this context refers to customer involvement in the financial results of the insurer, typically via a yearly dividend. Management determines the dividend amount.

original high-wealth owners selling their claims to others with low wealth is reduced when the owner's wealth is illiquid. Capital divisibility, and liquidity related capital costs, both relevant issues in this work, have not entered prior analyses.

The financial institutions literature contains many empirical studies of stock and mutual firms operating in the same market. These studies provide a rich set of stylized facts useful for judging the reasonableness of any theory of mutuality. Mutuals have higher expenses (O'Hara, 1981; Esty, 1997; Kroll et al., 1993; Cummins et al., 1999; Mester, 1989; Gropper and Beard, 1995) lower growth rates (O'Hara; Esty; Cordell et al., 1993) lower asset risk (O'Hara; Lee et al, 1997; Fraser and Zardkoochi, 1996; Esty) lower default risk (Lamm-Tennant and Starks, 1993; Hansmann, 1996 p256; Rasmussen, 1988; A.M. Best 1991, 1992; Fraser and Zardkoochi, 1996; Esty; Cordell et al.) and serve a less risky clientele (Smith and Stutzer, 1990) than their stock counterparts. Evidence on relative management compensation is mixed (Mayers and Smith, 1992; Kroll, et al.; O'Hara).

Of particular relevance is O'Hara (1981), which considers survival of the mutual savings and loan association (SLA), which coexists with the stock SLA. It finds less risk and more expenses in the mutual form relative to the stock form, and concludes that the mutual form is less efficient than the stock form. It attributes survival to regulatory frictions which slow down extinction. Interestingly, the findings are also consistent with this work, which concludes that the mutual form is as economically efficient as the stock form. The mutual here survives in a competitive setting by producing a high quality, high priced product. The high quality justifying the high price is low default risk.

3 Model

3.1 Timing

t=0:

Managers decide whether to start a firm to sell a financial product that reimburses a customer loss. Managers choose the organizational form of the firm: mutual or stock. In stock firms, Shareholders determine the amount of their equity infusion, and contract with managers for salary and asset risk. Shareholders offer the contract; managers accept or reject it. Stock managers make the other decisions: sales volume, and their level of effort, which determines operating expenses. Sales volume is measured in terms of the aggregate promised payment to customers, L . In mutual firms, the managers make all decisions. Customers decide whether and which offered product to buy. Regulators require total initial assets, A_0 , of $L + \underline{x}L$.

t=1:

Managers first pay customers. If the final asset value, A_1 , is less than L , then firm is in default, and customers receive the firm's remaining assets. That is, in default, each customer with a loss receives $\frac{A_1}{L}z_i$, where z_i is the customer loss. Absent default, managers collect s in salary and pay owners a liquidating dividend of $A_1 - L - s$.

3.2 Agents

3.2.1 Customers

Product demand arises from a large population of customers. A customer's wealth, w_i , is subject to a loss of size, z_i , and probability, p_i . The capital market lacks any security capable of hedging an individual loss. Customers may, however, purchase a product that promises to reimburse the entire loss. Customer utility is an increasing concave function of terminal wealth. Customers of mutual firms also supply capital, which is in addition to the stated price. Both the price and any capital contribution are small relative to w_i . Losses are independent across customers. Diversification across customers eliminates loss uncertainty, at the firm level. So $L = \sum_i p_i z_i$, $i \in \{\text{customers of the firm}\}$. The product market is competitive in the sense that all economic surplus accrues to customers in equilibrium. The customer objective follows.

Customer Optimization:

$$\underset{(q, P_q)}{\text{Max}} \quad (1 - p_i q) U_i(\omega_i - p_i z_i P_q) + p_i q U_i(\omega_i + z_i h - z_i - p_i z_i P_q) \quad (1)$$

$$\text{s.t. } (q, P_q) \in \{(q, P_q)\} \cup (1, 0)$$

where ω_i = initial wealth for customer i ,
 z_i = amount of loss for customer i ,
 p_i = probability of loss for customer i ,
 q = firm default probability,
 P_q = product price per unit of expected loss,
 $h = \frac{A_1}{L}$ = fraction of loss paid in default,
 $\{(q, P_q)\}$ is the set of available contracts, and
 U_i is the utility function for customer i .

With all other parameters exogenous, the customer is only concerned with price and default when considering a contract purchase. Contracts available to customer i may be denoted $(q, p_i z_i P_q)$. $(1, 0)$ is always available and represents forgoing the loss hedging product.

3.2.2 Owners

Owners supply capital. Any number of investors may own a stock firm. Also, an investor may own shares in any number of stock firms. Mutual owners are customers. They supply the capital requested by the manager for a fair return. Shareholders determine the capital infusion for a stock firm. Shareholders can transfer their ownership claims. Mutual customers can not. Owners value their equity claims accurately since they know U_m . The claim is a one period call option on the firm's final assets, A_1 , with a strike price of the firm's liability obligation, L . The claim is valued via Black and Scholes (1973). For untradeable ownership claims, e.g., mutual claims to dividends, a fraction of value, λ , is lost. Assets and losses are independent of financial market movements. The riskless interest rate is zero.

Value of Firm Equity, LC

$$LC = L [(1 + x) N(d_1) - N(d_2)] (1 - I\lambda), \text{ where} \quad (2)$$

- L = contracted liability payments to customers,
- C = value of equity per unit liability,
- x = initial firm surplus per unit liability,
- $d_1 = \frac{\ln(1+x)}{\sigma} + \frac{\sigma}{2}$,
- $d_2 = d_1 - \sigma$,
- σ = asset volatility,
- $I = 0$ if claims trade, 1 otherwise, and
- λ = fraction of value lost to illiquidity.

3.2.3 Managers

Identical managers aim to meet product demand from one of two organizational forms, while also meeting investor requirements, and their own reservation utility. Infinitely many identical managers will supply labor for a reservation utility, \underline{U}_m . The labor market exogenously determines \underline{U}_m , assumed to be 0, Manager utility $U_m(s, f)$, depends on salary and effort. Effort, f , eliminates $f g(L)$ of operating expense from a maximum of ML .

Manager Utility Function

$$U_m(s, f) = s^{\frac{1}{a}} - \frac{f}{b}, \text{ where}$$

s = compensation, payable if company does not default.

f = effort.

Operating Expenses and Effort:

operating expenses, $O = ML - f g(L)$ where

M = maximum expenses per unit L ,

$$g(L) = M e^{-c \left(\frac{\bar{L}-L}{\bar{L}} \right)^2}.$$

Manager Optimization

Managers maximize a utility function which depends on effort and salary. Managers always determine effort and size, which are not contractible. In the mutual firm, managers also determine all other choices. In the stock firm, shareholders determine manager salary, capital contribution amount, and asset risk. Shareholders maximize

unit investment return. Managers exert effort in order to increase their salary. A firm is fully characterized by asset risk, effort, initial surplus, size of the liability claim, and product price, $\{\sigma, f, x, L, P\}$.

The manager's maximization is:

$$\begin{aligned} \underset{\{org, m \text{ vars}\}}{Max} U_m(s, f) \ni \\ (q, P_q) = \arg Max U_i \text{ for customers } i, \ni \sum_i p_i z_i \geq L, \end{aligned} \quad (3)$$

$$x \geq \underline{x}, \quad (4)$$

$$L + Lx = P_q L + E - ML + f g(L) - s, \quad (5)$$

$$LC \geq E, \quad (6)$$

$$\{s, \sigma, E\} = \arg Max \frac{LC}{E} \text{ for stock organizations,} \quad (7)$$

where

$$\{org\} = \{stock, mutual\}, \text{ and}$$

$$\{m \text{ vars}\} = \text{additional manager choice variables,}$$

$$= \{s, f, L, \sigma, E\} \text{ in mutual organizations, and}$$

$$= \{f, L\} \text{ in stock organizations.}$$

Condition (3) is the product market constraint. It determines firm viability. Condition (4) is the regulatory constraint. Condition (5) is the cash flow constraint. Condition (6) is the investor participation constraint. Condition (7) is the shareholder constraint. It defines the contract between /shs and the manager.

3.3 Model Discussion

The model purposely abstracts from many aspects of reality. The intent of this work is to emphasize that essential aspects of organizational forms, together with the modeled features, alone are enough to explain a rich variety of organizational form phenomena. The foremost organizational form feature is differential valuation of owner claims and customer claims. Other important model features are risk averse managers, risk averse customers, and operating expenses reducible by costly effort.

Purposefully left out are many of the usual "suspects" considered when investigating financial institution mysteries: product market moral hazard and adverse selection, differential regulation, and differential products.⁸ Once the usual suspects

⁸Differential in the sense that there is an assumed correspondence with corporate form.

appear, models quickly become applicable only to financial firms, or worse to one financial industry. This theory is general enough to explain the scarcity of the mutual corporate form in manufacturing industries.

The following are essential features of the model, and drive the results. Customers and investors use different rules to value their financial claims on the firm, based on the alternatives available to them in the capital markets. Managers are averse to default risk, justified by human capital considerations. Stock and mutual firms differ with respect to managerial oversight and liquidity related costs of capital. Differential transferability of ownership claims accounts for both organizational form differences. The model is equilibrium in nature; the product price schedule is endogenous and decreases in firm default risk. The model is closed by assigning all economic surplus to customers, as is consistent with an assumed competitive product market.

Differential valuation by customers and owners is appropriate, despite the financial nature of both claims, and despite the fact that customers are the owners of mutual firms. The product claim which reimburses a loss is inversely related to the customer's marginal utility of consumption. In contrast the ownership claim, i.e., the dividend, has no such relation⁹ and is similar to other investments. Specifically, the product value decreases with default risk arising from variance of the surplus "cushion", whereas the ownership claim increases. The common use of "investment" valuation for both claims (e.g., Garven (1992)) values the claims from the perspective of a disinterested, i.e., uninsured, prospective buyer of the claims. Since the buyer's marginal utility of consumption has no relation to the split of cash flows between the two claims, the highest bid for the two claims is the price of the assets backing them. Such valuations do not reflect the customer/owner's point of view. It begs the question of why a customer entered into a value-destroying contract. This is clear since expenses ensure that the customer/owner paid more than the asset value for the two claims. Along with the level, dynamics of the valuation are problematic. Valuation can not serve as a device for inferring customer preferences regarding firm decisions. For instance, "investment" valuation of both claims implies mutual customers are indifferent to firm risk, and the split of cash flows between the two claims. The product claim, however, pays off in very bad states of the personal

⁹This ignores the fraction of default states in which the customer has a loss. The fraction is p , the customer loss probability. Clearly this case increase in importance with p . In practice large fixed costs, as a percentage of the premium, discourage insuring such losses. Low p , high z losses are the ones worth insuring.

world of the customer and is not replicable via the financial market. The equity claim pays off independently of personal states. Customers therefore care about the split of cash flows, which has value implications. Customers buying a product that reimburses a loss, are in a situation analogous to investors unprotected by limited liability. Since the product reimburses an incurred loss, default exposes unlucky customers to the maximum loss possible.

Customer valuation of the financial product does not determine product price, however. Price in the competitive equilibrium here, where firms are vying for customers and where customers accrue all economic surplus, reflects production functions of the two organizational forms. Customer valuation is only relevant to the customer choice regarding whether and which product to purchase. By selecting the product that offers the highest positive difference between private value and price, the customer maximizes utility. Merton (1989) introduces this point. Merton (1993) discusses it further.

Customers make separate hedging and investment decisions since losses, z_i , are independent of market movements. Customers achieve optimal investment portfolios despite the involuntary nature of the mutual equity investment. They adjust the risk level of the marketed portion of their investment portfolio to compensate for any undesired risk level of the mutual equity position.

Lack of default risk diversification by customers is a critical assumption. Diversification here means buying n contracts of size $\frac{F}{n(1-q)}$ from n different firms, where F is the promised payment of the original contract, and where different firms have independent q 's. When $n \rightarrow \infty$, the customer has no exposure to firm default risk. Then equilibrium product offering consists of a single contract, and organizational form. The contract is either the risky one described above, or one with no default risk. As seen later, stock firms sell risky contracts, and mutual firms sell risk free ones, so the contract implies organizational form. Thus diversification of default risk at the customer level eliminates organizational form coexistence. One form then dominates.

The assumption regarding customer non-diversification is realistic. In fact, customers do not buy fractional property-liability insurance contracts, nor do they finance residential real estate with multiple identical mortgages (this is the analogous banking product, discussed in section 5). The products do not exist. It is possible to buy multiple life insurance policies on the same life from different insurers. The possibility is unattractive since life insurance involves large fixed costs for each policy. The costs stem from underwriting and administration, and are not

included in the present model. For instance, illustrative rates of the largest US life insurer imply a fixed cost that is 10% of premium for a \$250,000 face amount policy, and 22% of premium for a \$100,000 face amount policy (Prudential Par Whole Life rates for a non-smoking female aged 35; A.M. Best, 1994). The average amount of life insurance carried by insured households is \$179,000 (ACLI, 1999). It is not necessarily insuring the same life. Additionally only 3% of insured households have more than \$500,000 of coverage (ACLI, 1999). These facts render diversification unappealing for most life insurance customers. Furthermore, financial company defaults have an industry wide component, so the assumption of independent q 's is not met. At most, only idiosyncratic default risk is diversifiable.

The valuation impact of liquidity differentiates this model from previous organizational form work. Stock and mutual firms both assign a stream of future dividends to owners. For stock companies, the dividend stream is capitalized and tradeable. If owners receive a liquidity shock, the claim may be monetized. Mutual owners, in contrast, must wait for the actual dividend payments since mutual dividend claims are not separable. Customers cannot sell them off and remain customers. Illiquid ownership claims are an unavoidable consequence of the essential nature of mutual firms: customer ownership. Evidence abounds that illiquidity significantly lowers the price of financial claims (e.g., Amihud and Mendelson, 1986; Silber, 1991; Boudoukh and Whitelaw, 1993; Longstaff, 1995; Amihud et al., 1997). Rational owners require compensation for illiquidity. This gives rise to a financing cost that is unique to the mutual firm.

The equilibrium approach yields a coexistence equilibrium that is stable. It obtains for a range of parameter values. In contrast, partial equilibrium analysis supports only knife-edge coexistence. Since stock and mutual firms do coexist in several financial industries, many countries (with differing regulatory regimes), and over long time periods, the actual equilibrium appears very stable. This emphasizes the importance of studying the viability of organizational forms, and specifically the questions here, in an equilibrium context.

The equilibrium model is closed by assigning all the economic surplus to customers. This reflects a competitive product market in which all economic rents are necessary to attract customer business. Other agents achieve only reservation values in equilibrium, despite optimizing. Investors will supply capital for a fair return. Fair returns are determined exogenously by the equity market, which is in equilibrium. Stock investors maximize the return per unit investment since they can divide their capital investments among any number of firms. Managers will op-

erate firms in exchange for their reservation utility. This implies intense managerial competition. They are constrained by a pool of managers ready to enter the market if utility rises above the reservation level. Managers of both organizational forms compete against all other managers for customer patronage. Although managers maximize utility, in equilibrium they only achieve their reservation level. Managers give customers all the rents in order to attract their patronage.

Both stock managers and stock equity holders make decisions. The stock optimization is expressed as a shareholder optimization, also involving a manager optimization. It is equivalent to a manager optimization, also involving a shareholder optimization. The shareholder optimization, however, highlights an essential difference between the stock and mutual organizational forms regarding divisibility of capital. Shareholders maximize the return per unit invested capital, $\frac{LC-E}{E}$, not the return on the entire invested capital of the firm, $LC - E$. The objective is a direct consequence of the infinite divisibility of financial capital. Since investors can invest in more than one firm, and in any amount, the size of the firm does not constrain the amount of capital the investor supplies. This is in contrast to the manager's situation. The manager must supply all human capital for exactly one firm. Therefore, the manager cares about the total value of human capital, or total U here.

Shareholders determine asset risk and salary in the modeled stock firm. Realistically shareholders do not choose asset risk. They do, however, pay the manager via a compensation contract that can depend on share value. It is possible to construct a compensation contract that has salary as a function of equity value, and that when combined with the initial equity infusion leads to the desired asset risk, and hence effort choice. In the interest of parsimony, the shareholders here simply set the asset risk and pay a salary that, when combined with the initial equity infusion, leads to the desired outcome. The modeled contract $\{E, \sigma, s\}$ is a parsimonious proxy for the complex realistic contract that leads to the same outcome.

Regulatory friction, i.e., $\underline{x} > 0$, is a simplifying component of the model. It precludes $q > \frac{1}{2}$, i.e., unrealistically high expected default rates. Specifying manager utility of default relative to utility of salary would also serve the purpose of ensuring $q < \frac{1}{2}$, as would further specification of customer utility. If $q \geq \frac{1}{2}$, then asset risk and default risk no longer move together, and both manager and shareholders prefer maximum asset risk. Also $\underline{x} > 0$ reflects reality for financial firms where actual required reserves are based on expected values. Note the excess reserve is unnecessary to ensure solvency when the assets backing the constant liability, L ,

have no risk. With risky assets, no finite \underline{x} is large enough to ensure solvency. Surplus serves as risk capital and accrues to owners. It is financed by selling claims to the ending surplus. In mutuals, the claims are illiquid and hence entail dead weight costs of $\underline{x}\lambda$.

Assuming identical products and identical managers strengthens the coexistence results. Constructing a separating equilibrium based on product or manager type is a straightforward exercise. Identical products are realistic in that both organizational forms sell the same financial products. Identical managers are not realistic. Although managers with different preferences may plausibly separate by organizational form choice, this work shows that such a feature is unnecessary to support an equilibrium with stock and mutual coexistence. Neither assumption, if relaxed, yields the additional results consistent with stylized facts.

Elimination of liability risk at the firm level is a simplifying assumption. It permits comparison to ordinary levered stock firm. It also abstracts from the issues of systematic vs. idiosyncratic risk, and relative manager utility of risk and effort. It is not necessary for the qualitative results, however. It is a relatively straightforward exercise to change the risk choice variable from asset risk to liability. Specifying utility allows the same results with both sources of risk. Restricting the risk source to one side of the balance sheet approximates reality for the typical financial sub industries. In general, assets account for risk in banks and life insurers, whereas liabilities do so for property-casualty insurers. Manager utility is specified for tractability to allow a closed form expression for the stock firm ruin rate. A wide range of concave functions generates coexistence results. Similarly, the impact of effort on expenses, $g(L)$, is specified. A wide range of functions with decreasing third derivatives generates coexistence results.

4 Equilibrium

Equilibrium implies satisfaction of three groups. Customers must be willing to purchase contracts offered. Managers must be willing to operate firms. Owners must be willing to supply equity capital. Firms compete for customer business, so the customers receive all the economic surplus.

An equilibrium is comprised of a set of products and a corresponding set of firms that sell the associated product. The pair, $\{(q, P_q)\}$, product default risk and product price define the product. A firm is defined by its organizational form, size, asset risk, managerial effort, and managerial salary.

It is instructive to consider two simpler settings before considering the full model, which contains financing costs, production costs, and agency costs. The first setting has financing costs only, and is consistent with the setting of Merton (1989). Financing costs have two components. One is the cost of raising liquid capital. The other is the cost of compensating owners for holding illiquid claims. The second setting has both financing and production costs. Production costs are manager salary and operating expenses. The full model's agency costs stem from incomplete manager contracts. There is also no contract between the manager and the customers. Additionally, size and effort are not contractible. Managers always decide the amount of product to sell and effort to exert.

Proposition 1: Equilibrium with only Financing Costs

With complete contracts and no production costs, the equilibrium is characterized by stock firms selling riskless liability claims for a unit price of 1. That is, stock firms sell $(0, 1)$. Asset risk, σ is 0, and L is indeterminate. The other characterizing variables, s , f , and O , are zero by assumption.

A bond analogy illuminates the result. $L P^S(q)$ is the price of a bond having the same risk characteristics as the financial product. A bond investor values a dollar in default states the same as a dollar in non default states. The bond price, $P^S(q)$, reflects this. The concavity of $P^S(q)$ results from the pattern of expected payments in default states, not from risk aversion on the part of the investor. In contrast, the customer values a dollar in default states more than a dollar in non default states. Furthermore the value of an extra dollar in default increases as the partial payment decreases. The expected partial payment decreases with increasing q . So customer risk aversion concavifies $P^D(q, u)$ relative to $P^S(q)$, and the equilibrium product has a price of $P^S(0)$ and no risk.

This setting is consistent with Merton (1989). The analysis uses the same reasoning introduced there. The critical point is the customer valuation is inconsistent with financial market valuations. This does not imply an arbitrage opportunity because the customer contracts are not replicable with capital market securities. It also does not imply that price is determined by the customer valuation. In a competitive product market, price is determined by costs. Customer valuation only affects actual price to the extent of placing a maximum on viable prices. The main effect of customer valuation is to determine market share, based on the relative appeal, i.e., customer valuation, of the products offered.

Proposition 2: Equilibrium with Financing and Production Costs

With complete contracts, financing costs, and production costs, the equilibrium contract is riskless and sold from a stock firm. The following values characterize the equilibrium firm and policy.

$$L^{**} = \bar{L} \left(\frac{1}{2} + \frac{\sqrt{1 - \frac{2}{c} + \frac{2}{ac}}}{2} \right). \quad (8)$$

$$s^{**} = b^{\frac{1}{a-1}} \left(\frac{M}{a} \right)^{\frac{a}{a-1}} e^{-\frac{ca}{a-1} \frac{\bar{L}-L}{\bar{L}}}. \quad (9)$$

$$f^{**} = \left(\frac{Mb^a}{a} \right)^{\frac{1}{a-1}} e^{-\frac{c}{a-1} \left(\frac{\bar{L}-L}{\bar{L}} \right)^2}. \quad (10)$$

$$O^{**} \text{ is unit operating expense, } M - \frac{f^{**} g(L^{**})}{L^{**}}. \quad (11)$$

$$P^{**} = 1 + O^{**} + \frac{s^{**}}{L^{**}}. \quad (12)$$

Since managers and shareholders had no economic surplus in the previous equilibrium, the positive production costs of this setting are borne by customers. P^{**} is a lower bound for the product price in the full setting.

4.1 Full model

Proposition 3

Mutual firms offer the following policy, and have the following values:

$$q^m = 0. \quad (13)$$

$$P^m = 1 + \lambda \underline{x} + O^m + \frac{s^m}{\bar{L}}. \quad (14)$$

$$L^m = \bar{L}, \quad (15)$$

$$s^m = \left(\frac{a}{bM} \right)^{\frac{a}{a-1}} e^{\frac{ac}{a-1} \left(\frac{\bar{L}-L}{\bar{L}} \right)^2}, \quad (16)$$

$$f^m = b \left(\frac{a}{bM} \right)^{\frac{1}{a-1}} e^{\frac{c}{a-1} \left(\frac{\bar{L}-L}{\bar{L}} \right)^2}, \text{ and} \quad (17)$$

$$O^m = M - \frac{f^m M}{\bar{L}} e^{-c \left(\frac{\bar{L}-L}{\bar{L}} \right)^2}, \quad (18)$$

$$x^m = \underline{x}. \quad (19)$$

Proposition 4

Stock firms offer the following policy, and have the following values:

$$L^s = \bar{L} \left(\frac{1}{2} + \frac{\sqrt{1 - \frac{2}{c}}}{2} \right). \quad (20)$$

$$s^s = b^{\frac{1}{a-1}} \left(\frac{M}{a} \right)^{\frac{a}{a-1}} e^{-\frac{ca}{a-1} \frac{\bar{L} - L^s}{L}}. \quad (21)$$

$$f^s = \left(\frac{Mb^a}{a} \right)^{\frac{1}{a-1}} e^{-\frac{c}{a-1} \left(\frac{\bar{L} - L^s}{L} \right)^2}. \quad (22)$$

$$O^s \text{ is unit operating expense, } M - \frac{f^s g(L^s)}{L^s}. \quad (23)$$

$$P^s = 1 + O^s + \frac{s^s}{L^s}. \quad (24)$$

Proposition 5

Stock firms have lower unit operating expenses than do mutual firms.

The above result is a consequence of capital divisibility. Since human capital concerns dominate mutual choices, the absolute net expense savings is maximized. Given that size is a choice variable, it is no surprise that unit costs suffer. In the stock form, financial capital concerns determine shareholders choices. Low unit expenses is their aim. The mechanics of the manager effort decision puts weight on unit values instead of aggregate ones. The major determinant, default rate, is a unit value. The result depends on (??) which implies $g()$ approaches its peak gradually, and that a component of stock dead weight, s_q is not very large.

The modeled manager can be viewed as a proxy for all stock company employees. To the extent technology substitutes for human effort, stock firms should employ it more readily than mutuals, since eliminating staff lowers the dead weight cost of compensation related to default risk. Mutuals, on the other hand have an advantage in hiring people since they do not compensate for default risk. The technology issue, since it affects expense savings, compensation, and operating costs, if relevant strengthens proposition 5.

Proposition 6: Equilibrium Organizational Form Coexistence

Let $k_l < 0$ denote the indifference slope of the stock customer with lowest RA.

Let $k_h < k_l$ denote the indifference slope of the customer with highest RA.

Mutuals dominate when: $k_l \leq \frac{P^s - P^m}{q^s}$.

Stocks dominate when: $\frac{P^s - P^m}{q^s} < k_h$

Mutuals and stocks coexist when: $k_h \leq \frac{P^s - P^m}{q^s} < k_l$.

Recall that the above-described policies result from considering only one organizational form, and assuming viability (that is, customer demand for the product offered). The final step in equilibrium determination is a comparison of the two contracts. Only cases where both policies are viable are discussed and illustrated. Results where fewer policies are viable are as expected. Organizational form dominance and coexistence results are now a straight forward application of the customer decision. Denote the customers who would purchase the stock policy if it were the only one offered as “stock customers ” and similarly for “mutual” customers.

If all stock customers prefers the mutual policy to the stock policy, then the mutual form dominates. If all mutual customers prefer the stock policy to the mutual policy, then the stock form dominates. In all other cases there is coexistence, with some customers buying the mutual policy and others buying the stock policy. The policyholders who would buy either policy if it were the only one on offer, separate according risk aversions, RA . Such customers with RA below some value RA^* buy the stock contract, and the others buy the mutual one.

As discussed, the slope of a customer indifference curve depends on the specifics of the product claim payout in ruin states. One can generalize to the extent that RA 's and negative slopes always increase in absolute value together. So customer risk aversions can be characterized by the indifference curves slope.

Proposition 7

Mutual products cost more than stock products. $P^m > P^s$.

This seemingly unnotable conclusion achieves propositional status because it contradicts a widely held notion that an advantage of mutuals is that they can offer cheaper contracts. This is done by treating all money from the customer and the dividend payment as homogenous, instead of decomposing the $t = 0$ payment into premium and equity components. For instance, the CEO of a large mutual states,

The theoretical argument in favor of mutuals is very clear and very strong. A well-run mutual should deliver better value to its policyholders

than if that same insurer were a stock company, because all the surplus in the business is returned to policyholders. (Womack, 2000)

In terms of the notation here, the CEO's statement is:

$$\begin{aligned} P^m + (1 - \lambda)x - x &< P^s, \text{ which is true since} \\ P^m + (1 - \lambda)x - x &= P^* + \lambda x + (1 - \lambda)x - x, \\ &= P^* < P_q^s. \end{aligned}$$

The analysis here illuminates the problem of the traditional calculation. "Premium" charges consist of both the premium proper, analogous to the stock premium, and an equity infusion that funds the required surplus. The CEO's "true cost of insurance" is the charged premium reduced by the equity supported dividend which includes compensation for the illiquid nature of the equity investment. The illiquidity compensation does not belong in the product cost calculation because it represents earnings on the equity investment. Those earnings compensate for actual liquidity risk borne by the customer. Including them ignores the fact that mutual customers bear a type of risk that has no analog for stock customers. Accurate true costs are the charged premium, reduced by only a portion $(1 - \lambda)$ of the dividend. Premiums charged mutual customers are not explicitly divided into true premiums and equity.

The fallacy of the traditional analysis is most vivid when applied to perpetual fire policies. The perpetual fire insurance customer places a lump sum with the insurer who provides fire coverage, pays annual dividends, and returns the lump sum to the customer when the policyholder discontinues the arrangement. The traditional calculation produces a negative price for the insurance coverage, since the insured receives more than the original "Premium." Proper analysis reveals perpetual fire policies as illiquid investments. The return on the investment consists of two components: a cash dividend and fire coverage.

Corrolary to Proposition 7

Mutual viability requires a demand price schedule that decreases with firm default risk. Consider the price decrease from a default risk of 0 to a default risk of q^s , the stock firm default rate. Firstly, it must be less than the price/default tradeoff of the most risk averse customer who buys the product. That is, there must be a customer type with an indifference border that is both above $P(0)$ and has a larger decrease over $q \in [0, q^s]$ than $P(0) - P(q^s)$. Secondly, $P(0) - P(q^s)$ must

be large enough to cover the increased costs of the mutual as compared to the stock. If the price curve is not steep enough (negative), then stock firms dominate because no customer values future firm existence enough to support the mutual. Horizontal price curves characterize demand schedules for non-financial products. Such customers do not value continued firm existence enough to support the mutual's higher costs. They may value low default, say for replacement parts, repairs, and future product availability, but not enough to support the mutual's high costs. This explains the dearth of mutuals outside the financial sector.

5 Non-Intermediaries

For firms serving non-financial product markets, the model rationalizes the rarity of mutual firms.

5.1 Non-Intermediaries

The crucial change for non-intermediaries is nearly horizontal customer indifference borders in (product price, firm bankruptcy risk) space. Without a steep enough slope (that is without some customers with indifference border slopes steeper than the line intersecting the high priced and safe mutual product and the low priced and risky stock company product, the expenses of the mutual form are unsupportable and mutuals can not compete with stocks in the product market.

This work offers an explanation for the dearth of non-financial mutuals. The mutual corporate form requires customer willingness to pay a premium for safety.

In all product markets, firm default is aversive to customers. Reasons include availability of replacement parts, service requirements, search costs, information costs, and habit formation. Such reasons give rise to customer willingness to pay a premium for safety. Financial firm customers find firm default risk particularly aversive because the value of their future claim is greatly reduced in default. Although both financial and non-financial customers are likely to value firm safety, reason dictates that the financial customer values it more highly, than does the non-financial customer. Consider the product price increase necessary to support the higher costs associated with the mutual form. If financial customers will pay such amount to reduce firm default risk from the stock to the mutual level, and if non-financial customers will not, then mutual viability will be strictly a financial sector phenomenon.

Non-financial customers appear unwilling to pay enough extra for safety in order to subsidize the financing expenses of the mutual form. Apparently the security of knowing replacement parts will be available when a real product breaks is worth much less than the security of knowing one will be dealing with a solvent insurer after a covered loss.

5.2 Further Discussion

Stock form dominance in all non-financial sectors suggests that customer preference for future firm existence is only strong enough in financial product markets to subsidize the additional expenses of the mutual form. The lack of stock form dominance in the financial sector suggests that the technologies of expense reduction can not overcome the value of the mutual's implicit contract with management to avoid risk for the most risk averse customers.

Proposition 4 provides a rationale for the lower claim rates reported for early mutuals described in Smith and Stutzer (1995).¹⁰ Customers with high risk aversions are likely to limit exposure to circumstances that may lead to insurance claims.

6 Demutualization Demystified

6.1 Background

Demutualization is the term for a mutual firm changing its corporate form to stock. "Full" demutualization entails replacing the mutual equity (a.k.a. policyholder's surplus) with stock shares. The mutual equity goes to the customers who relinquish ownership. The stock equity is raised from new shareholders. The firm goes forward as a stock company. Today mutuals have a second option.

In the life insurance industry, mutual firms are *demutualizing*, that is converting to stock firms at a striking rate. For instance, in 1996 seven of the top ten US life insurers were mutuals. Five years later, only three of the seven remain mutuals.¹¹ The time period spent as mutual organizations for the four converting firms ranges from 85 to 137 years. This indicates the gravity of the decision to enter a process that is time consuming, expensive, and subjects the firms to negative publicity. Life insurer demutualization is a worldwide phenomenon. For example, all

¹⁰Note that this is not inconsistent with anything here. The lack of asymmetric information regarding p and L makes relative claim rates unimportant in this setting.

¹¹Prudential, the largest US life insurer is currently in the midst of the process.

of Canada’s “Big Four” demutualized within two years of enabling regulation. In general regulatory restriction and encouragement are insignificant in life insurance conversions, in contrast to thrift conversions. Property-liability insurers generally are not demutualizing.

In the midst of the spate of conversions, a new organizational form emerged, the mutual holding company (MHC). It shares features with both stock and mutual forms. It may issue non-controlling amounts of transferable equity, but customers must own at least half of the firm. MHC’s give mutual managers a second alternative when they are contemplating conversion to the stock corporate form. The MHC structure is controversial. Since managers remain shielded from takeover threats, some argue that it is driven by management eluding discipline. That view, in effect, sees MHC’s as inferior stock companies. This work illuminates the MHC as a superior mutual company. Like mutuals, MHC’s avoid control by non-customer investors. The discretion conferred on managers frees them to act on their risk aversion. Unlike mutuals, however, they do not have to pay liquidity premiums to raise funds. This confers a financing cost advantage on the MHC relative to a standard mutual firm.

6.2 Explanation

The model here supplies a list of environmental changes that lead to one or the other corporate form decreasing in viability. Such decreases can motivate switching to the other organizational form. The liquidity feature of this work generates a new and justifiable explanation of current switches from mutual to stock forms in the life insurance industry.

Comparative statics emerging from the model here offer rational explanations for current demutualization phenomena. In particular mutuals are less viable or less able to compete with the stock form when:

1. Liquidity cost, λ_q , increases.
2. Population of high RA customers decreases.
3. Capital requirements, \underline{x} , increase.
4. Managerial risk aversion, a , decreases.
5. Cost of effort, b , increases.

Explanations 1&3, support the following story which is consistent with observed facts. The relevant liquidity cost involves the opportunity cost of the retail investor.

If retail investors only have access to illiquid investments (for instance due to trading restrictions or high transaction costs) then mutual firms do not need to pay a liquidity premium to owners to lure them away from liquid investments. On the other hand, if the investment opportunity set of small investors includes choices increasingly more liquid than mutual dividend streams, then mutual firms will need to pay a increasingly higher liquidity premium to owners. Such is the case since the demise of regulated equity commissions, as documented in Jones (2000). During the last three decades transactions costs declined steadily and substantially. An incrementally higher cost of capital encourages under investment. Anecdotal reports indicate that insurers in general, and especially mutuals, under-invest in technology in comparison to other types of firms. Recall also the model implication that the mutual form encourages use of human capital instead of technology. Also recall that mutuals have higher expenses than stocks. Under-investment in technology does not threaten survival if it features significantly, if not equally, across organizational forms throughout an industry. This seems to be the case for insurance. So why life insurance and why now? The much anticipated November 1999, overhaul of banking law allows banks to enter the insurance business. Banks have lower expense levels than insurers. Indeed insurers have long sold investment products through banks. The products are often both a better deal for the customer and more profitable for the insurer. Banks and life insurers both sell investment types of products, so entering the life, as opposed to property-liability segment of the business seems the better strategy. One could suppose that under-investment in technology is finally threatening mutual survival. In order to invest in expense decreasing technology, insurers need capital. Liquidity costs render raising capital very expensive for mutuals. Anticipated large investments justify the expense of demutualization. The validity of this story is an empirical question. Empirical evaluation is outside the scope of this work, but merits future attention.

7 Conclusion

This work contributes to the understanding of organizational form. It demonstrates how interacting product, labor, and capital markets admit a stable coexistence of two organizational forms in a competitive setting. It rationalizes an array of facts provided by the empirical literature.

It employs an equilibrium model. This is critical because partial equilibrium analysis only supports a knife-edge coexistence. Efficiency is only consistent with one organizational form dominating for a range of parameter values. Such a result suggests that anti-competitive factors are at work supporting the actual stable coexistence in the financial sector. In an equilibrium context, e.g., where product price is endogenous, survival of the fittest is no longer inconsistent with more than one organizational form.

In equilibrium, mutual firms sell high priced, low risk products to customers with high risk aversions. Stock firms sell low priced, high risk products to customers with low risk aversions.

Both financial and operational inefficiency contribute to the mutual firm's high costs. High financing costs arise from the illiquid nature of mutual equity claims. High operational costs stem from managerial discretion, and the indivisibility of human capital. Unconstrained, mutual managers optimize aggregate values since their human capital is indivisible. In contrast, stock managers, influenced by shareholders whose financial capital is divisible, optimize unit values.

The mutual form allows managers to commit to operating a low risk firm, since there is no incentive to do otherwise. An explicit contract is unnecessary. Thus mutual products are safer than stock products. Stock firms' higher risk does not arise from risk shifting. For financial firms, risk-shifting is inconsistent with equilibrium in a full information setting. Shareholders prefer a zero risk firm because the loss in product price outweighs the risk based increase in their equity claim. Risk gives rise to agency costs, as a direct result of incomplete contracting for effort. Shareholders employ risk to motivate the risk averse manager to make effort, which reduces expenses. The cost of expense reducing efforts increase, however. Managers require additional compensation to tolerate remaining risk, which cannot be completely eliminated by effort. Also, customers pay less for a risky product than a safe one.

The link between mutual viability and the financial sector results from the customer's product valuation. Customers prize low firm risk when a product serves to hedge an otherwise unhedgeable loss. Thus the mutual firm's low risk enables it to

recover high costs via a high product price.

Stability arises from the heterogeneity of risk tolerance in the customer population. Shifts in parameter values shift the relative market share of the two forms.

Once the historical, global, and multi-industry coexistence is rationalized, it is a straightforward exercise to generate drivers of changes in market share. Testing such hypotheses offers a strategy for understanding the genesis of the current global demutualization trend of life insurers. Such work awaits.

References

- ACLI, 1999, Life Insurance Fact Book.
- A.M. Best Company, 1994, Flitcraft Compend.
- A.M. Best Company, 1991, Special Report: Best's Insolvency Study of Property/Casualty Insurers. *Special Report*
- A.M. Best Company, 1992, Special Report: Best's Insolvency Study of Life/Health Insurers.
- Allen, F. and Gale, D., 1999, "Corporate governance and competition," Wharton Financial Institutions Center working paper 99-28.
- Amihud, Y. and Mendelson, H., 1986, "Asset pricing and the Bid-Asked spread," *Journal of Financial Economics* 17:223-249.
- Amihud, Y., Lauterbach, B., and Mendelson, H., 199 "Market microstructure and securities values: evidence from the Tel Aviv stock exchange,"
- Black, F. and Scholes, M., 1973, "The pricing of options and corporate liabilities," *Journal of Political Economy* 81: 121-132.
- Bohn, J., 1996, "How Entrenched are Managers of Mutual Financial Firms? Evidence from the Insurance Industry," working paper.
- Brennan, M., 1979, "The pricing of contingent claims in discrete time models," *Journal of Finance* 34: 53-68.
- Boudoukh, J. and Whitelaw, R., 1993, "Liquidity as a choice variable: a lesson from the Japanese government bond market," *Review of Financial Studies* 6: 265-292.
- Cordell, L., MacDonald, G. and Wohar, M., 1993, "Corporate ownership and the thrift crisis," *Journal of Law and Economics* 36: 719-756
- Cummins, J. D., Weiss, M. and Zi, H., 1999, "Organizational Form and Efficiency: An Analysis of Stock and Mutual Property-Liability Insurers," *Management Science* 45: 1254-1269.

- Doherty, N., 1991, "The design of insurance contracts when liability rules are unstable," *Journal of Risk and Insurance* 43: 227-246.
- Esty, B., 1997, "Organizational Form and Risk-taking in the Savings and Loan Industry," *Journal of Financial Economics* 44: 25-55.
- Fama, E., 1980, "Agency Problems and the Theory of the Firm," *Journal of Political Economy* 88: 288-307.
- Fama, E. and Jensen, M. 1983, Separation of Ownership and Control. *Journal of Law and Economics* 26: 301-325.
- Fama, E. and Jensen, M., 1983, "Agency Problems and Residual Claims," *Journal of Law and Economics* 26: 327-349.
- Fraser, D. and Zardkoohi, A., 1996, "Ownership Structure, Deregulation, and Risk in the Savings and Loan Industry," *Journal of Business Research* 37: 63-69.
- Friend, I. and Lang, L., 1988, "An empirical test of the impact of managerial self-interest on corporate capital structure," *Journal of Finance* 43(June): 271-281.
- Galai, D., and Masulis, R., 1976, "The Option Pricing Model and the Risk Factor of Stock," *Journal of Financial Economics*, 3, January/March.
- Garven, J. R., 1992, An exposition of the implications of limited liability and asymmetric taxes for property-liability insurance, *Journal of Risk and Insurance* 59(March): 34-56.
- Gilson, S. and Vetsuypens, M., 1993, "CEO compensation in financially distressed firms: an empirical analysis," *Journal of Finance* 48(June): 425-58.
- Gropper, D.M. and T.R. Beard, 1995, "Insolvency, Moral Hazard, and Expense Preference Behavior: Evidence from US Savings and Loan Associations," *Managerial and Decision Economics* 16: 607-617.
- Hansmann, H., 1985, "The Organization of Insurance Companies: Mutuals versus Stock," *Journal of Law, Economics and Organization* 1: 125-153.
- Hansmann, H., 1989, "The economic role of commercial non-profits: the evolution of the US savings bank industry, in Anheier, H. and Seibel, (ed.s) *The Third Sector: Comparative Studies of Nonprofit Organizations*. De Gruyter.

- Hansmann, H. *The Ownership of Enterprise*. Cambridge, MA: The Belknap Press of Harvard University Press, 1996.
- Hart, O., 1983, "The market mechanism as an incentive scheme," *Bell Journal of Economics* 14: 366-382
- Jagannathan, R. and Srinivasan, S., 2000, "Does Product Market Competition Reduce Agency Costs?" NBER working paper 7480.
- Jensen, M. and Meckling, W., 1979, "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," *Journal of Financial Economics* 3: 305-360.
- Jones, C., 2000, "A Century of Stock Market Liquidity and Trading Costs," Columbia University working paper.
- Kroll, M., Wright, P. and Theerathorn, P., 1993, "Whose Interests Do Hired Top Managers Pursue? An Examination of Select Mutual and Stock Life Insurers," *Journal of Business Research* 26: 133-148.
- Lamm-Tenant, J. and Starks, L., 1993, "Stock versus Mutual Ownership Structures: The Risk Implications," *Journal of Business* 66: 29-46.
- Lee, S., Mayers, D. and Smith, C., 1997, "Guaranty Funds and Risk-Taking: Evidence from the Insurance Industry," *Journal of Financial Economics* 44: 3-24.
- Longstaff, F., 1995, "How much can marketability affect security values?," *Journal of Finance* 50: 1767-1774.
- Mayers, D. and Smith, C. S., 1981, "Contractual provisions, organizational structure, and conflict control in insurance markets," *Journal of Business* 54: 407-433.
- Mayers, D. and Smith, C. S., 1986, "Ownership Structure and Control: The Mutualization of Stock Life Insurance Companies," *Journal of Financial Economics* 13 : 73-98.
- Mayers, D. and Smith, C. S., 1988, "Ownership structure across lines of property-casualty insurance," *Journal of Law and Economics*, 31: 351-378.

- Mayers, D. and Smith, C. S., 1992, "Executive Compensation in the Life Insurance Industry," *Journal of Business* 65: 51-74.
- Mayers, D. and Smith, C. S., 1994, "Managerial discretion, regulation, and stock insurer ownership structure," *Journal of Risk and Insurance* 61: 638-655.
- Mester, L.J., 1989, "Testing for Expense Preference Behavior: Mutual versus Stock Savings and Loans," *RAND Journal of Economics* 20: 483-498.
- O'Hara, M., 1981, "Property Rights and the Financial Firm," *Journal of Law and Economics* 24: 317-332.
- Murphy, K., 1998, Executive Compensation, in Ashenfelter, O. and Card, D. (eds.) *Handbook of Labor Economics*, vol. 3, North-Holland.
- Pottier, S. and Sommer, D., 1997, "Agency Theory and Life Insurer Ownership Structure," *Journal of Risk and Insurance* 64: 529-543.
- Rasmussen, E., 1988, "Mutual Banks and Stock Banks," *Journal of Law and Economics* 31: 395-421.
- Rosen, S., 1992, "Contracts and the Market for Executives," in Wein, L. and Wijkander, H. (eds.) *Contract Economics*, Blackwell Publishers.
- Smith, B.D. and Stutzer, M., 1990, "Adverse selection, aggregate uncertainty, and the role for mutual insurance contracts," *Journal of Business* 63: 493-510.
- Smith, B.D. and Stutzer, M., 1995, "A Theory of Mutual Formation and Moral Hazard with Evidence from the History of the Insurance Industry," *Review of Financial Studies* 8: 545-577.
- Saunders, A., Strock, E., and Travlos, N., 1990, "Ownership Structure, Deregulation, and Bank Risk Taking," *Journal of Finance* 45: 643-654.
- Slavin, M., Sushka, M. and Polonchek, J., 1993, "The value of bank durability: borrowers as bank stakeholders," *Journal of Finance* 48: 247-266.
- Silber, W., 1991, "Discounts on Restricted Stock: the impact of illiquidity on stock prices," *Financial Analysts Journal* July/Aug.

Troske, K., 1996, "The dynamic adjustment process of firm entry and exit in manufacturing and finance, insurance, and real estate," *Journal of Law and Economics* 39:705-725.

Womack, S., 2000, "Our mutual friends," A.M. Best's Insurance Week.

8 Appendix

Proposition 1: Equilibrium with only Financing Costs

With complete contracts and no production costs, the equilibrium is characterized by stock firms selling riskless liability claims for a unit price of 1. That is, stock firms sell $(0, 1)$. Asset risk, σ is 0, and L is indeterminate. The other characterizing variables, s , f , and O , are zero by assumption.

Proof:

With only financing costs, managers are irrelevant.

The choice variables are org , E and σ , which will determine q and $P(q)$. The viable product gives customers the highest utility that is compatible with satisfying the owner.

For all fixed q 's, financing costs are lower for a stock firm than a mutual firm per (2). So the equilibrium firm is a stock company.

Asset risk, and default risk are zero by the following argument.

Fix x arbitrarily.

Then there is a monotonic correspondence between σ and q .

Let $P^S(q)$ = the lowest product price allowing owner satisfaction.

Let $P^D(q, u)$ = the product price allowing the customer a utility of u .

For any capital infusion, equity value, LC , increases with q .

So the firm can supply a lower priced product as q increases.

In particular, $L P^S(q)$ = firm value - equity value = $L(1 + \underline{x}) - LC$, and $P^S(0) = 1$.

Note the payoffs of the liability claims are the same as those of a bond issued by the firm, with a face amount of L .

$L P^S(q)$ is the price of a bond having the same risk characteristics as the financial product.

Facing such a supply, customers will prefer the zero risk product because they are more averse to risk than bond investors.

Although $\frac{\partial P^D(q, u)}{\partial q} < 0$, $P^D(q, \underline{u}) < P^S(q) \forall q > 0$ when \underline{u} is defined by $P^D(0, u) =$

$P^S(0) = 1$. So the equilibrium product has no risk and a price of 1.

Proposition 2: Equilibrium with Financing and Production Costs

With complete contracts, financing costs, and production costs, the equilibrium contract is riskless and sold from a stock firm. The following values characterize the equilibrium firm and policy.

$$L^{**} = \bar{L} \left(\frac{1}{2} + \frac{\sqrt{1 - \frac{2}{c} + \frac{2}{ac}}}{2} \right). \quad (25)$$

$$s^{**} = b^{\frac{1}{a-1}} \left(\frac{M}{a} \right)^{\frac{a}{a-1}} e^{-\frac{ca}{a-1} \frac{\bar{L}-L}{\bar{L}}}. \quad (26)$$

$$f^{**} = \left(\frac{Mb^a}{a} \right)^{\frac{1}{a-1}} e^{-\frac{c}{a-1} \left(\frac{\bar{L}-L}{\bar{L}} \right)^2}. \quad (27)$$

$$O^{**} \text{ is unit operating expense, } M - \frac{f^{**} g(L^{**})}{L^{**}}. \quad (28)$$

$$P^{**} = 1 + O^{**} + \frac{s^{**}}{L^{**}}. \quad (29)$$

Since managers and shareholders had no economic surplus in the previous equilibrium, the positive production costs of this setting are borne by customers. P^{**} is a lower bound for the product price in the full setting.

By the same argument as above, the firm will be shareholder owned.

The equilibrium product is a feasible one that most appeals to customers. With effort and size contractible, operating expenses bear no relation to risk. The other production cost, manager salary, increases with risk, since $E[U_m]$ decreases with q . Total production costs therefore increase with q . So all agents want $q = 0$.

Since managers and shareholders had no economic surplus in the previous equilibrium, the positive production costs of this setting are borne by customers.

The product in this equilibrium is risk free, by the same arguments as in the prior case. With full contracting, there is no relation between risk and effort.

Owners are irrelevant since any amount of capital infusion exactly supports a fair claim. The claim is equivalent to risk free debt. The equilibrium product has the lowest unit production costs that satisfy managers i.e., it satisfies

$$\underset{f,L}{Min} \quad M + \frac{s - f g(L)}{L} \quad \ni \quad U_m(s, f) \geq \underline{U}. \quad (30)$$

Salary must achieve the reservation utility and compensate for effort. The utility constraint is binding.

$$\text{The } L \text{ FOC is: } 0 = \frac{\partial \frac{s-f g(L)}{L}}{\partial L} \quad (31)$$

$$= -\frac{f^a b^{-a}}{L^2} - f M e^{-c \left(\frac{\bar{L}-L}{\bar{L}}\right)^2} \left(-\frac{1}{L^2} + \frac{2c}{L} \frac{\bar{L}-L}{\bar{L}^2}\right). \quad (32)$$

$$\text{The } f \text{ FOC is: } 0 = \frac{\partial \frac{s-cf(f,L)}{L}}{\partial f} \quad (33)$$

$$= \frac{ab^{-a} f^{a-1}}{L} - \frac{M e^{-c \left(\frac{\bar{L}-L}{\bar{L}}\right)^2}}{L}, \text{ So} \quad (34)$$

$$L^{**} = \bar{L} \left(\frac{1}{2} + \frac{\sqrt{1 - \frac{2}{c} + \frac{2}{ac}}}{2} \right). \quad (35)$$

$$s^{**} = b^{\frac{1}{a-1}} \left(\frac{M}{a} \right)^{\frac{a}{a-1}} e^{-\frac{ca}{a-1} \left(\frac{\bar{L}-L}{\bar{L}}\right)^2}. \quad (36)$$

$$f^{**} = \left(\frac{M b^a}{a} \right)^{\frac{1}{a-1}} e^{-\frac{c}{a-1} \left(\frac{\bar{L}-L}{\bar{L}}\right)^2}. \quad (37)$$

$$O^{**} \text{ is unit operating expense, } M - \frac{f^{**} g(L^{**})}{L^{**}}. \quad (38)$$

$$P^{**} = 1 + O^{**} + \frac{s^{**}}{L^{**}}. \quad (39)$$

Proposition 3

Mutual firms offer the following policy, and have the following values:

$$q^m = 0. \quad (40)$$

$$P^m = 1 + \lambda \left(\underline{x} - \frac{s^m}{\bar{L}} \right) + O^m + \frac{s^m}{\bar{L}}. \quad (41)$$

$$L^m = \bar{L}, \quad (42)$$

$$s^m = \left(\frac{a}{bM} \right)^{\frac{a}{a-1}} e^{\frac{ac}{a-1} \left(\frac{\bar{L}-L}{\bar{L}}\right)^2}, \quad (43)$$

$$f^m = b \left(\frac{a}{bM} \right)^{\frac{1}{a-1}} e^{\frac{c}{a-1} \left(\frac{\bar{L}-L}{\bar{L}}\right)^2}, \text{ and} \quad (44)$$

$$O^m = M - \frac{f^m M}{\bar{L}} e^{-c \left(\frac{\bar{L}-L}{\bar{L}}\right)^2}, \quad (45)$$

$$x^m = \underline{x}. \quad (46)$$

Proof:

As explained, mutual managers prefer riskless insurance policies, and risky mutuals will not arise in this setting. This simplifies $t = 0$ cash flows in equation (5) as follows.

$$L + Lx = P_0L + (1 - \lambda)(Lx - s) - ML + f g(L), \quad (47)$$

The LHS of (5) is the value of firm assets after all activity at $t = 0$.

On the RHS, the first term is the payment for the product and the second term is the payment for the ownership claim. The claim has no risk, so it is the face amount reduced for illiquidity. Both come from the customers.

The third and fourth terms are the operating expenses after the manager exerted effort.

With $\sigma = 0$, the choice of x is separable.

As x increases, only the second terms of both sides of equation (5) change. The LHS term increases faster than the RHS one. So a higher x 's, requires higher P_0 's, but yields no benefits to any agent. Since the minimum possible product price is necessary for firm survival among the other competing mutuals, so the manager chooses $x = \underline{x}$.

Rearranging gives: $P_0 = 1 + \lambda(\underline{x} - \frac{s}{L}) + M - \frac{f g(L)}{L}$, where $P_0, L, f, \& s$ are not yet characterized. P_0 is determined last. It is the lowest value such that the manager, after optimizing, achieves the reservation utility. The other unidentified variables, $L, f, \& s$ have only two degrees of freedom. At the margin, managers take expense savings home as salary, so $s = s_0 + f g(L)$ for some negative constant s_0 . This simplifies the mutual managerial optimization to:

$$\underset{L, f}{Max} \quad U_m(s_0 + f M e^{-c\left(\frac{\bar{L}-L}{\bar{L}}\right)^2}, f). \quad (48)$$

$$\text{The } L \text{ FOC is: } 0 = \frac{\partial U_m}{\partial L} = \frac{\partial U_m}{\partial s} \frac{\partial s}{\partial L} \text{ which reduces to} \quad (49)$$

$$0 = \frac{\partial s}{\partial L} \text{ since } \frac{\partial U_m}{\partial s} \text{ is never zero.} \quad (50)$$

$$= f M e^{-c\left(\frac{\bar{L}-L}{\bar{L}}\right)^2} \frac{2c}{\bar{L}} \frac{\bar{L}-L}{\bar{L}}, \text{ So,} \quad (51)$$

$$L^m = \bar{L}. \quad (52)$$

$$\text{The } f \text{ FOC is: } 0 = \frac{\partial U_m}{\partial f} = \frac{\partial U_m}{\partial s} \frac{\partial s}{\partial f} + \frac{\partial U_m}{\partial f} \quad (53)$$

$$= \frac{1}{a} s^{\frac{a-1}{a}} M e^{-c \left(\frac{\bar{L}-L}{\bar{L}} \right)^2} - \frac{1}{b}. \text{ So,} \quad (54)$$

$$s^m = \left(\frac{a}{bM} \right)^{\frac{a}{a-1}} e^{\frac{ac}{a-1} \left(\frac{\bar{L}-L}{\bar{L}} \right)^2}, \quad (55)$$

$$f^m = b \left(\frac{a}{bM} \right)^{\frac{1}{a-1}} e^{\frac{c}{a-1} \left(\frac{\bar{L}-L}{\bar{L}} \right)^2}, \text{ and constraint 3 gives,} \quad (56)$$

$$P^m = 1 + \lambda \left(\underline{x} - \frac{s^m}{\bar{L}} \right) + O^m, \text{ where} \quad (57)$$

$$O^m = M - \frac{f^m M}{\bar{L}} e^{-c \left(\frac{\bar{L}-L}{\bar{L}} \right)^2}. \quad (58)$$

Proposition 4

Stock firms offer the following policy, and have the following values:

$$L^s = \bar{L} \left(\frac{1}{2} + \frac{\sqrt{1 - \frac{2}{c}}}{2} \right). \quad (59)$$

$$s^s = b^{\frac{1}{a-1}} \left(\frac{M}{a} \right)^{\frac{a}{a-1}} e^{-\frac{ca}{a-1} \frac{\bar{L}-L^s}{\bar{L}}}. \quad (60)$$

$$f^s = \left(\frac{M b^a}{a} \right)^{\frac{1}{a-1}} e^{-\frac{c}{a-1} \left(\frac{\bar{L}-L^s}{\bar{L}} \right)^2}. \quad (61)$$

$$O^s \text{ is unit operating expense, } M - \frac{f^s g(L^s)}{L^s}. \quad (62)$$

$$P^s = 1 + O^s + \frac{s^s}{L^s}. \quad (63)$$

Proof:

The stock firm solution is most easily seen by considering the owners' optimization, constrained by the manager's optimization. The customers' optimization is reflected via price taking. The slope of the price w.r.t. q is known, but the level is not. The price level is determined last; since customers retain all economic rents the price is the minimum allowed while allowing the other two agents to achieve reservation levels at the end of their optimizations.

Lemma 1:

Shareholders always make choices s.t. $x = \underline{x}$.

Proof:

Through σ and E shareholders effectively determine x and f .

Consider all cases:

$x < \underline{x}$: Regulators disallow this option.

$x = \underline{x}$ and f too low: The shareholder options are either (a) to increase σ , or (b) to decrease x . Regulators disallow (b) so shareholders increase σ .

$x = \underline{x}$ and f too high: The shareholder options are either (a) to increase x , or (b) to lower σ . Option (a) requires the investor to increase E , and hence lowers the objective ratio. Option (b) lowers salary and increases premium in equilibrium. This lowers E , and hence increases the objective ratio. Clearly this dominates (a).

So, $x = \underline{x}$.

The stock manager optimization is:

$$\underset{L, f}{Max} \quad E[U_m]. \quad (64)$$

$$\text{The L FOC is: } 0 = \frac{\partial E[U_m]}{\partial q} \frac{\partial q}{\partial \frac{f g(L)}{L}} \frac{\partial \frac{f g(L)}{L}}{\partial L} + \frac{\partial E[U_m]}{\partial f} \frac{\partial f}{\partial L}, \text{ or,} \quad (65)$$

$$\begin{aligned} 0 &= \frac{\partial \frac{f g(L)}{L}}{\partial L} \text{ since } \frac{\partial E[U_m]}{\partial q}, \frac{\partial q}{\partial \frac{f g(L)}{L}} \text{ are non-zero and } \frac{\partial f}{\partial L} \neq 0 \\ &= -\frac{1}{L} f M e^{-c \left(\frac{\bar{L}-L}{L} \right)^2} \left(\frac{2c \bar{L} - L}{\bar{L}} - \frac{1}{L} \right). \end{aligned} \quad (66)$$

$$L^s = \quad (67)$$

$$\text{The f FOC is: } 0 = \frac{\partial E[U_m]}{\partial q} \frac{\partial q}{\partial f} + \frac{\partial E[U_m]}{\partial f}. \quad (68)$$

$$= s^{\frac{1}{\alpha}} \frac{q'}{\alpha L(1+x)} - \frac{1}{b}. \quad (69)$$

$$f = \frac{\alpha(1+x)L^s}{q' b g(L^s)} \text{ by Lemma 2.} \quad (70)$$

The relation between f and q is described by (71), where q' denotes the pdf associated with q .

Shareholders preferred q is the remaining item necessary for determining the stock offering. The shareholders choose q based on their maximization of $\frac{C}{E}$. Knowing $x, L^s, f(q)$ and recognizing σ implies q , and a binding utility constraint, their

optimization is now:

$$\begin{aligned}
 \text{Max}_q \quad & C - 1 - \underline{x} + P - M + \frac{cf - s}{L^s}, \text{ or} \\
 \text{Max}_q \quad & C + P + \frac{cf - s_f - s_q}{L^s}
 \end{aligned} \tag{72}$$

where s_q is the salary related to q , and

where s_f is the salary related to f .

$$\text{The FOC is: } 0 = \frac{\partial \left(\frac{cf - s_f}{L^s} \right)}{\partial f} \frac{\partial f}{\partial q} - \frac{\partial \left(\frac{s_q}{L^s} \right)}{\partial q} + \frac{\partial C}{\partial q} + \frac{\partial P}{\partial q}. \tag{73}$$