Abstract

Demutualization is a complicated conversion procedure whereby an insurance company changes its form of business organization from mutual to stock company. Historically, much research was performed to explain the rationale of the conversion, but mainly relied on empirical analyses. Our contribution on this issue is to develop a game-theoretical background for the demutualization process, understand the rational behavior of policyholders about the managerial decision, help policyholders to design a different demutualization procedure in order to encourage managers to act for the owners’ best interests, and furnish insurance regulators with more insight into maintaining the fairness of the procedure.
Introduction

The life insurance industry consists of firms with two distinctive ownership structures: mutual and stock. In a mutual insurance company, policyholders exist as owners and customers of the company by purchasing insurance policies; their claims against the company are not only the promise of monetary reimbursement on the occurrence of future contingent events, but also the ownership of the company. In a stock insurance company, policyholders are simply customers and their claims against the company are strictly limited to the future benefits from insurance policies they purchase. Shareholders in a stock company are the owners of the company with residual claims against the company’s assets.

The recent decade’s demutualization trend set by leading life insurance companies has raised the question: what is the optimal form of organization in the insurance industry? Numerous articles on business organization focus heavily on ownership structure, comparative cost efficiency, or executive compensation to explain the choice of optimal organizational form [Mayers and Smith (1981), Mayers and Smith (1986), Masulis (1987), and Mayers and Smith (1992)]. However, few studies have taken a game theoretic approach to rationalize actions by managers and policyholders in a demutualization process. Our primary contribution is to investigate demutualization from the game theoretic perspective.

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In the first game, we assume that policyholders in a mutual company face two different types of managers in terms of their motives for recommendations: good or bad. The information asymmetry exists because the manager’s true intention is not observable by policyholders.

A “good” manager is one who recommends a demutualization to her policyholders because her intention of recommending the conversion is not to increase her personal wealth level but to make decisions on behalf of policyholders. In contrast, a “bad” manager is one who sends a recommendation of demutualization because he wants to increase his personal wealth from the process. Mayers and Smith (1981) found that managers in a stock company may have greater opportunities for more fringe benefits. They also discovered that managerial compensation should be higher in stock companies than in mutual companies because opportunities for job-related perquisites is lower in mutual firms and because managerial compensation should be related to decision-making authority. As a consequence of demutualization with a “bad” manager, the firm value would actually be decreased due to increased fringe benefits to the manager.

Upon receiving a demutualization recommendation, policyholders confront the uncertainty. They are not sure if their manager is honest enough to recommend the demutualization on behalf of policyholders, so that the demutualization will become profitable to policyholders, and the loss of firm value due to additional/unnecessary fringe benefits to managers will be minimal.

We investigate the existing design of demutualization process as a dynamic game with a perfect message. Policyholders should make their decision to maximize their expected net profit, even when the type of the manager is unknown. In this layout,
policyholders receive a demutualization recommendation only when their manager sends a message of “demutualization.” But no communication concerning demutualization between policyholders and managers needs to be established when the managers’ recommendation is to stay as a mutual company. Here, the message from a manager is *unilateral* because he/she requests policyholders to vote for the conversion only when the board of directors adopts a demutualization plan.

We acknowledge that an explicit response by policyholders must be followed as a form of voting when a manager sends a recommendation, but no response is required when the recommendation is “stay-mutual.” However, we should consider “no interaction” as an implicit response by policyholders because it creates distinctive decision nodes in a demutualization game, with corresponding payoffs to policyholders as well as to managers. We posit that policyholders respond to maximize their wealth from a demutualization with recognition of the asymmetric information issue, owing to the uncertainty about *motives* of managers. We conclude that policyholders must consider the agency costs associated with having a bad manager in a demutualization. In other words, policyholders should not take the recommendation from managers, unless the expected net profit from a conversion exceeds the expected agency costs from having a bad manager.

In the second game (the differential compensation case), we posit that the policyholders’ optimal strategy should be altered if we assume the differential compensation schemes to managers in a mutual and a stock, i.e., a fixed compensation plan for managers in a mutual company and an incentive-oriented compensation design in
a stock company. Now, the manager’s interest is not necessarily explicitly aligned with the best interest of policyholders when the company exists as a mutual, but it should be when the company becomes a stock company, due to the change of the compensation scheme. A demutualization should be considered as a delicate event in which even a good manager delivers a recommendation to policyholders to increase her personal wealth at the expense of a loss in firm value.

We conclude that, unlike the case with identical compensation schemes for managers, not only the bad manager but also the good manager experiences conflicts of interest because the change of compensation plan from a fixed to an incentive-oriented salary arrangement appeals to the good manager. We conjecture that the modification of managerial compensation between a mutual company and a stock company should provide a valuable inference to policyholders and managers in the demutualization process.

In the third game (case where type and profitability of demutualization are positively correlated), we assume that there is uncertainty in a demutualization process associated with the effectiveness by managers. A good manager possesses superior knowledge/ability, compared to a bad manager, so that she can “effectively” enhance the probability of a profitable demutualization. Therefore, informational asymmetry exists because policyholders will not know if their manager is effective enough to suggest a conversion, and the demutualization is likely to be profitable due to her knowledge or ability to increase the probability. Since a good manager will deliver a demutualization plan to policyholders only when she is confident about her ability to make the conversion
more profitable, we define a good type as the manager who is capable of enhancing the profitability of the conversion.

We consider the third game as an “imperfect message” case. Messages are imperfect because the probability of having a successful conversion is not certain because of different “effectiveness” levels between managers. We investigate the expected net profits maximizing solution for policyholders when the message is imperfect. In this analysis, we classify managers in terms of their “effectiveness.” Therefore, the probability, that the demutualization becomes a value-increasing project to the firm, is higher when policyholders take good managers’ recommendation rather than bad managers’, i.e., \( p_G > p_B \), where \( p_G \) is the probability that a demutualization is profitable when policyholders take a good manager’s recommendation and \( p_B \) is the probability of a profitable demutualization when a bad manager’s recommendation is taken. Using the framework of a game with imperfect information, we explore optimal conditions for a successful demutualization to a dominant equilibrium strategy.

The paper starts with a brief literature review and a description of a demutualization procedure, followed by a simple illustration of the process, to promote better understanding of a demutualization. We examine three cases of demutualization with different designs of demutualization games and corresponding assumptions for each case to derive optimal conditions for policyholders’ demutualization decision. We conclude the paper with the implications of agency cost issues in demutualization processes to policyholders and insurance regulators based on results from our study.


**Literature Review**

The ownership structure in the insurance industry has been studied to explain the conflict of interest between managers and policyholders in a mutual company, and between policyholders and shareholders in a stock company. Analogously to incentive problems between bondholders and shareholders in a corporation, policyholders in a mutual insurance company face problems which are similar to those faced by bondholders due to the separation of claims.

Mayers and Smith (1981) investigated ownership structure of insurance companies with respect to costs of controlling management and compensation plans to management. They found that the cost of controlling management is higher in a mutual insurance company so that mutual companies should be more prevalent in lines of insurance where management exercises little discretion. They also discovered that the managerial compensation should be higher in stock companies than in mutual companies, both because the opportunities for job-related perquisites are rare and because managerial compensation should be related to decision-making authority.

In their subsequent study, Mayers and Smith (1986) found that the incentive problem between policyholders and managers is more severe in a mutual company, while the costs of conflict between policyholders and stockholders can be reduced with mutual ownership, due to a consolidated claim. While Jensen and Meckling (1976) found that firms reorganize when they look for an ex post efficiency from the conversion, they concluded that the conversion was “on average efficiency-enhancing” for a set of firms that converted from stock to mutual.
Studies on the economic efficiency of ownership structure were also implemented for conversion of mutual savings and loan companies. Masulis (1987) analyzed wealth gains and losses to contractual parties, prior to and posterior to conversion of mutual companies, to examine conditions for organizational choice. In addition to several external factors, he discussed potential agency cost advantages of mutual companies over stock companies\(^2\). Mutual companies moderate conflicts of interest between risk-averse depositors and return-driven owners, and between owners and managers due to no separation of customer, owners and managers.

However, those agency cost advantages are offset by the initiation of deposit insurance and the advantages of specialization of management and risk bearing management. Contrary to Mayers and Smith (1986), Masulis (1987) concluded that sources of organization efficiencies are likely to result from the conversion decision. In other words, conversion to a stock company is considered and implemented to utilize scale and scope of economies, and the demand for increased managerial expertise and discretion.

Riskier operation of a company is not only evidenced by a change of a manager’s risk bearing management activities in stock insurance companies, but also enhanced by self selection acts by insurance customers. Smith and Stutzer (1990) proved that insurance customers with low loss probability signal their type by sharing aggregate risks with their insurers. High-risk type customers purchase their policies from stock companies, while lower risk types buy from mutual companies to share risks with

\(^2\) External factors considered include more competitive and demanding regulatory environment, discontinued tax advantages for mutual Savings and Loan companies, and growing demand for sophisticated interest rate hedging expertise.
insurers. Ligon and Thisle (forthcoming) suggested that information asymmetry explains the coexistence of mutual and stock insurance companies.

Mayers and Smith (1992) discussed managerial control and compensation to managers in mutual companies and stock companies. They argued that the market for managerial control is less effective in disciplining mutual managers and as a result managerial control is more expensive in mutual companies. As they posited, mutual companies should be specialized in areas where less managerial discretion is required, and the compensation to managers in mutual companies should be less than that to managers in stock companies.

In his two papers, Esty (1997a, 1997b) concluded that organizational form alters the amount of risk taking by savings and loan associations, and found the empirical evidence from the case study. Based on his measure of profit variability of mutual and stock associations, he found that the risk shifting is more common in stock thrifts, and stock thrift managers increase the payoff to leveraged equity by increasing the volatility of firm value. Schrand and Unal (1998) also depicted that a firm’s total risk increased when the firm converts from a mutual thrift to a stock institution. Lee, Mayers and Smith (1997) found a similar conclusion from the insurance industry, and concluded that managers in stock insurance companies have stronger incentives to increase asset risk than managers of mutual companies.
Conversion procedure

Demutualization is defined as a process to convert the form of an insurance company from mutual to stock company. The following diagram (Figure 1) shows a demutualization process in general.

As a step to launch a demutualization, the board of directors of an insurance company adopts the plan which was initially proposed by the manager of the company. In sequence or usually at the same time, the manager of the firm calls for policyholders to vote for or against the plan. Generally, the plan is delivered to each policyholder with voting rights to explain the demutualization plan and the required voting process in detail. If the voting result turns out to be favorable to launch the demutualization plan, the fairness of the demutualization plan needs to be approved by state commissioners after conducting a public hearing under the supervision of state commissioners. The effective
date of the demutualization is determined through an Initial Public Offering. In other words, the demutualization becomes effective as the IPO closes.

As a final stage of a complete demutualization, the company needs to compensate existing policyholders for the ownership of the mutual company. Usually the compensation to policyholders takes place by three different forms: cash, stock or policy credit enhancement. The monetary value of compensation to each policyholder can be finalized after the conclusion of the Initial Public Offering, since the value of mutual ownership is proportional to the value of stock ownership after conversion. To reduce the possibility of inappropriate cash depletion from undue cash compensation, the company usually restricts the total amount of cash compensations from demutualization.

We incorporate the following issues into the second and the third procedure in Figure 1 where the interaction between manager and policyholder is indispensable and significant in a demutualization. What should be policyholders’ best response to the demutualization recommendation from the management team of the company? Can policyholders trust the board of directors or managers?
Basic Notations and Assumptions

Given a set of private information about the type of manager \( T \in \{t_1, t_2\} \), where \( t_1 \) is “good” and \( t_2 \) is “bad”), the manager \((S): \) denoted for “Message Sender”) recommends either one of two possible actions \((M \in \{m_1, m_2\} \), where \( m_1 \) is “demutualize” and \( m_2 \) is “stay-mutual”) to policyholders \((R): \) denoted for “Message Receiver”) so that they can vote for or against the demutualization if it is recommended.

Policyholders receive the recommendation from the manager, and they choose their optimal action from a set of feasible actions \((A \in \{a_1, a_2\} \), where \( a_1 \) is “accept recommendation” and \( a_2 \) is “reject recommendation”), depending on their prior belief about the type of manager, for instance, their prior belief about the type of manager when the message is “demutualization” is denoted as \( \mu(t_i | m_j) \). Payoffs to managers \((S) \) and policyholders \((R) \) are given by \( U_S(t_i, m_j, a_k) \) and \( U_R(t_i, m_j, a_k) \), respectively. For instance, \( U_S(t_1, m_1, a_1) \) denotes for the payoff to managers \((S) \) if policyholders accept \((a_1) \) the demutualization message \((m_1) \) recommended by a good manager \((t_1) \).

We assume the risk neutrality for managers and policyholders in a demutualization process. Certainly, assuming risk averse for policyholders makes conditions for equilibrium closer to realistic requirements for outcomes from a demutualization attempt. Drawback from the risk neutrality assumption reduces the significance of conclusion marginally but seems to be minimal in exchange for simplicity of illustration without a loss of generality.

A.1. Probability of Profitable Demutualization
In the base case or perfect message case, the *ex ante* probability that demutualization turns out profitable is a constant \( p \) and it is determined by Nature. Analogously, there is a certain portion \( p \) of firms whose demutualization will be a value-adding plan among many companies. The manager does not know whether his plan will turn out to be successful with absolute confidence, so the net profit from a demutualization is random.

Meanwhile, in the third game where type and profitability of demutualization are positively correlated (or imperfect message case), one type of manager has an ability to increase the chance of having a profitable outcome to a greater probability \( p_G \) than the probability with the other type of manager \( p_B \), hence \( p_G > p_B \). This describes the difference between two types of managers, and we denote the first type as *good* and the second as *bad* in the imperfect message case. Policyholders do not know the *ex ante* probability of successful conversion because they don’t know whether their managers are good or bad!

### A.2. Firm Value

When the demutualization is profitable, the firm value \( V \) is expected to increase by \( \pi \). But the firm value is decreased by \( l \) if the demutualization is unprofitable. The chance of having either state depends on the assumption concerning the probability of profitable conversion \( p, p_G \text{ or } p_B \). In the perfect message case, the *ex ante* probability of having profitable demutualization is fixed \( p \) and it is determined by Nature. However, in the imperfect message case, the probability varies with the type of manager.
because their abilities for promoting a successful demutualization are not identical.

A.3. Proportion of each type of manager in the economy

Suppose the information exclusively available to the board of directors or the managers in a mutual company is the type of manager \( t_i \). The proportion of each type of manager is chosen by Nature. Realizing the possibility of informational asymmetry between the manager and themselves, policyholders want to maximize their wealth from a demutualization by maximizing the reimbursement received for their ownership interest in the mutual company. Here, we examine the condition for equilibrium where the manager’s and policyholders’ expected wealth are maximized with given assumptions about the probability of each type of manager. Let \( g \) stand for the probability that the type of manager is good (i.e., \( \text{prob}(t_i) \)) and \( 1 - g \) stand for the probability that the type of manager is bad (i.e., \( \text{prob}(t_i) \)).

Whether this probability is objective or subjective is worth mention. The proportion of each type of manager or probability of having one type of manager in a firm depends on the perception of policyholders about their managers, so that the probability can be subjective. However, the subjectivity of the probability is systematically intertwined in the prior belief about the type of manager by policyholder, since the belief is a conditional probability of each type of manager given a message received. Simply, the proportion of one type of manager in an economy is a constant fact, but policyholders don’t know who is which type.
A.4. Payoff for manager \( U_s(t_i, m_j, a_t) \)

Previous studies (Mayers and Smith (1981), Mayers and Smith (1992)) focused on the compensational incentives to managers to explain the reason of conversion from mutual to stock company. Mayers and Smith (1992) showed that the managerial compensation is lower in mutual companies because “mutuals have a comparative advantage over stock in business activities requiring less managerial discretion.” In contrast, Masulis (1987) showed that managerial compensation should be higher with stock companies because of various compensation plans. Avoiding possible arguments concerning dominant incentives for managers between two forms of organization, we can indisputably assume that managerial compensation can be relevant to the firm’s performance in a stock company without a loss of generality.

The manager’s expected wealth maximizing solution for the perfect Nash equilibrium solution can be found as follows. For each type of manager \( t_i \), a message from manager \( m_j \) and given the policyholders’ payoff maximizing strategy \( a^*(m_j) \), the manager’s message \( m^*(t_i) \) must maximize his wealth. That is, \( m^*(t_i) \) solves

\[
\max_{m_j \in M} U_s(t_i, m_j, a^*(m_j)).
\]

In a demutualization, the explicit message delivered from a manager is always a “demutualization” recommendation \( m_i \) so that the manager sends the same message to policyholders. In other words, voting for/against a demutualization would be necessary only when managers recommended the plan. The recommendation by a manager creates explicit decision nodes for policyholders in terms of whether they need to accept or reject
the recommendation. However, we should consider “no recommendation” as a message of “stay mutual” because policyholders know it must have been an implicit message of “stay-mutual” if there was no recommendation from their manager concerning a demutualization.

In the differential compensation case, we assume that the compensation to managers in a mutual company is given in a fixed form \( (c_M) \) so that the compensation to managers resembles the bondholder’s claims against the company. For managers in a stock company, we assume that managerial compensation is proportionally \( (k > 0) \), where “\( k \)” is referred as “the proportional compensation factor”) dependent on the firm value, to reflect on performance-based and market-based compensation plans in a stock company such as employee stock option plan (ESOP).

A.5. Agency Costs

We assume that the value of the ownership compensation to policyholders is decreased by the agency cost \( (c_a) \) when the type of the manager is bad \( (t_2) \) and the voting outcome is in agreement with the recommendation \( (a_1) \). For simplicity, we do not consider the fact that the voting incurs sizeable expenses associated with the voting procedure. We have an assumption that there is an incentive for bad manager to convert the form of organization for his compensation, i.e. fringe benefits, after the demutualization because his compensation is increased by the amount of perquisite \( (c_a) \), where \( c_a > 0 \) if the form of the company is changed into a stock company.
A.6. Payoff for policyholder \( U_{R}(t_i, m_j, a_k) \) and her prior belief \( \mu(t_i | m_j) \)

To derive the plausible and explicit solution from a demutualization process, we need to formulate payoffs for policyholders and manager so that we can find the perfect Bayesian-Nash equilibrium in demutualization games.

Suppose that the value of the firm before demutualization is \( V \) and the payoff for each player depends on the form of the organization. We need to characterize policyholders’ optimal action for a given recommendation and the policyholders’ belief about the type of manager inferred from the recommendation. Because the manager knows the full history of the game when they choose a recommendation, this choice occurs at a singleton information set. Obviously, the manager knows what type of manager he/she is. However, when policyholders choose their voting action after observing a demutualization recommendation from the manager, they do not know the type of manager so that policyholders’ choice occurs at a nonsingleton information set. If the board of directors (or managers of the firm) didn’t adopt the demutualization plan, there is no message sent by manager so that payoffs should not depend on the type of manager.

The action by policyholders is optimized with a given message from the manager and the policyholders’ belief about the information not available to the policyholders, i.e., the type of manager. The objective function for policyholders becomes the following.

\[
\max_{a_k \in A} \sum_{m_j \in M} \sum_{t_i \in T} \mu(t_i | m_j) \cdot U_{R}(t_i, m_j, a_k)
\]

This gives answer to find the best strategy in terms of choosing \( a_1 \) or \( a_2 \) when the message was “to demutualize” or “to stay-mutual” but the policyholder does not know which type of manager sends the message.
A.7. Best Response by Policyholders

A bad manager has an incentive to mimic a good manager’s recommendation in order to disguise his true type and increase his personal wealth level as a manager in a stock company. But, policyholders do not know the type of their manager so that they experience informational asymmetry problem in a demutualization. Without the informational asymmetry problem, demutualization would be beneficial to policyholders if \( p \pi - (1 - p)l > 0 \) (nonnegative net profit condition with a single manager). When a manager recommends a demutualization, two possible responses are available to policyholders: “agree” \( (a_1) \) or “disagree” \( (a_2) \). However, when the manager’s recommendation is “stay-mutual,” no interaction is established and no response by policyholders is required. However, policyholders should consider their payoffs from staying mutual either because they rejected managers’ conversion recommendation or because managers do not recommend the demutualization to policyholders.
The Base Case (Perfect Message)

The demutualization process is unique in the context that a manager sends his/her recommendation only when he/she prefers “demutualize (\(m_1\))” to “stay mutual (\(m_2\)),” otherwise there will be no actual interaction between managers and policyholders. The information asymmetry exists because policyholders are unaware of the type of managers and their decision should be made based on their prior belief concerning the sincerity of recommendation and their expected payoffs on their each decision node.

Considering the assumption concerning the payoffs for managers and policyholders, we can build the demutualization process as a dynamic interaction between managers and policyholders. Certainly, policyholders do not want to follow managers’ recommendation if their manager is inferred to be the bad type unless the net profits from a demutualization are significantly high enough to cover the expected agency costs associated with a bad manager.

\[\text{Figure 2: Extensive Form for the Base Case}\]

, where \(t_1\) “Good” type manager, \(t_2\) “Bad” type manager, \(m_1\) “Demutualization” message, \(m_2\) “Stay-mutual” message, \(a_1\) “Agree” to demutualization recommendation, \(a_2\) “Disagree” to demutualization recommendation, \([g]\) probability of having “Good” manager, \([1-g]\) probability belief by policyholder that the “Demutualization” recommendation is from “Good” manager, \([q]\) probability belief by policyholder that the “Stay-mutual” recommendation is from “Good” manager, and \([1-q]\) probability belief by policyholder that the “Stay-mutual” recommendation is from “Bad” manager.
The extensive form of game (Figure 2) shows payoffs to managers and policyholders in a demutualization process when the manager possesses private information not available to policyholders and the manager sends a distinctive message to policyholders. For example, the paired notation at the terminal node on the top of the right hand side in the diagram indicates the payoffs to the manager and policyholders, respectively, when the type of the manager is “good ($t_1$),” the message from the manager is “demutualization ($m_1$),” and the action by policyholders ($R$) is “agree ($a_1$)” to demutualization recommendation. Since the voting approval is not required when the recommendation by the manager is “stay mutual,” the payoffs on the left hand side of the diagram for both players are determined not by responses from policyholders but simply by types of managers and messages from managers.

Now, we want to find the condition for the pure-strategy perfect Bayesian Nash Equilibrium. First, we need to define the pure strategies for the manager. The manager’s strategy (Sender) with private information is inferred to be one of the followings:

(S1): Demutualization by both types [$m_1(t_1)m_1(t_2)$],
(S2): Demutualization when his type is Good and stay-mutual when his type is bad [($m_1(t_1)m_2(t_2)$)],
(S3): Stay-mutual when his type is Good and demutualization when his type is bad [($m_2(t_1)m_1(t_2)$)], or
(S4): Stay-mutual by both types [$m_2(t_1)m_2(t_2)$].

For policyholder (Receiver), her choice of strategies for a given message concerning the demutualization can be:

(R1): Accept the recommendation when the message is demutualization [$a_1(m_1)$],
(R2): Reject the recommendation when the message is demutualization [$a_1(m_1)$],
Noticeably, strategies for policyholders are restricted to (R1) or (R2) due to the existence of single explicit message (i.e. demutualization). Since the explicit message from the manager is only one, “demutualization \((m_i)\),” policyholders should choose between two responses, accept \((a_1)\) or reject \((a_2)\) the demutualization, as their optimal strategy.

To make the implicit “no recommendation” message as an explicit message of “stay mutual \((m_2)\)” in our game, we can safely assume that policyholders should take “no recommendation” from their managers as a message of unfavorable condition for a conversion. With this reasonable assumption concerning a demutualization process, the extensive form of demutualization game should be extended into a two-sided form which is similar to a conventional signaling game but with one-sided incomplete information. Without modifying the assumption about the information asymmetry between manager and policyholder, we can find the equilibrium condition for the game.

Noticeably, this game of demutualization creates additional payoff nodes with no decision making process since implied reactions by policyholders to the manager’s recommendation are also possible even when their manager sends no message. Policyholders’ response can be “agree to demutualize” or “disagree to demutualize” when the recommendation is “demutualize,” but their implicit response is only “agree to stay” without a voting process when the explicit recommendation is not made.

For the explicit recommendation message, \(m_i\), the policyholders’ optimal action, \(a^*(m_i)\), must maximize the policyholders’ expected wealth in terms of the firm value,
given the belief about the type of manager from the recommendation message. That is, 
\( a^*(m_1) \) solves the following:

\[
a^*(m_1) \in \arg\max_{a_t \in \mathcal{A}} \sum_{t \in \mathcal{T}} \mu(t_i \mid m_1) \cdot U_R(t_i, m_1, a_k)
\]

To derive a solution, we would like to find conditions where accepting demutualization plan \( a_t \) is the best action by policyholders. Policyholders will agree to the demutualization plan as long as their expected wealth level after demutualization is greater than the current expected wealth level.

Considering conditions for employing different strategies by policyholders and two types of managers, we identify conditions for dominant strategies and/or the equilibrium of the game.

First, we need to define conditions where “agreement to managers’ recommendation” is the best strategy for policyholders. For “agreement to demutualize” to be the best response by policyholders, the payoff to policyholders must be higher than the level when policyholders reject a demutualization plan or when the firm stays mutual. We have the following conditions for “accept” to be the best response.

\[
(1) [p \pi - (1 - p) l] > 0: \text{for “accept” strategy by policyholder to be the best response when the demutualization message was sent by the good manager}
\]
\[
(2) [p \pi - (1 - p) l - c_a] > 0: \text{for “accept” strategy to be the best response when the message was sent by the bad manager}
\]
\[(3)g[p\pi - (1 - p)l] + (1 - g)[p\pi - (1 - p)l - c_a] > 0: \text{ if both (1) and (2) hold, then}

"accept" is the best response when the message was sent either by good manager or by bad manager. We know that (3) equals \(p\pi - (1 - p)l > (1 - g)c_a\).

The "accept" is the best response by policyholders irrespective of the type of their manager as long as the expected net profits from a demutualization is greater than the potential amount of the fringe benefit or agency costs, \(\{p\pi - (1 - p)l\} > c_a\). It is the best response for policyholders to "reject" a demutualization if the net profits are negative: \(\{p\pi - (1 - p)l\} < 0\). However, it depends on the expected agency costs, \((1 - g)c_a\), when the net profit is between zero and the agency costs, \(0 < \{p\pi - (1 - p)l\} < c_a\). In other words, whether it is the best strategy for policyholders to "accept" or "reject" depends on the probability of having a particular type of managers and the amount of the agency costs. For instance, if policyholders know that 90 percents of managers in the economy are good types, policyholders decide to agree to the demutualization as long as the net profits is greater than one-tenth of the agent costs. *If the proportion of bad managers increase and the agency costs are higher, the policyholders’ decision is most likely to "reject" the conversion.*

Second, we want to find conditions in which it is the best strategy for a good manager to recommend a demutualization \((m_g)\). Since she knows her type, her strategy to recommend is optimal as long as the compensation in a stock company is greater than the compensation in a mutual company.
\[ k[p(V + \pi) + (1 - p)(V - l)] > kV, \text{ where } 0 < k < 1 \]

(4) \[ k[p\pi - (1 - p)V] > 0 \]

\[ \Rightarrow p\pi - (1 - p)V > 0 \]

Noticeably, the condition for a good manager to recommend a demutualization corresponds with the condition for policyholder to “accept” a demutualization when the message was sent by a good manager. The condition for a demutualization assuming only good managers in the economy must be identical to the case of a demutualization without the information asymmetry. Hence, as long as a demutualization is profitable, policyholders’ and a good manager’s best strategies are in tandem.

Lastly, a bad manager will recommend a demutualization \((m_i)\) if his expected compensation in a stock company is greater than the compensation in a mutual company. But, unlike a good manager, he needs to consider how much his firm’s value reduces due to the fringe benefit so that his salary reduces as he exploits the chance to increase the fringe benefits.

\[ p[k(V + \pi - c_a) + c_a] + (1 - p)[k(V - l - c_a) + c_a] > kV \]

(5) \[ k[p\pi - (1 - p)V] + (1 - k)c_a > 0 \]

\[ \Rightarrow p\pi - (1 - p)V > \left(1 - \frac{1}{k}\right)c_a, \text{ where } 0 < k < 1 \text{ and } \left(1 - \frac{1}{k}\right) < 0 \]

A bad manager considers both the proportional compensation in his salary and the fringe benefits from a demutualization because he may reduce his salary if he exploits the excessive amounts of fringe benefits from the firm. He decides to deliver a
demutualization plan to policyholders unless the net profits are less than \((1 - \frac{1}{k})\cdot c_a\), “the net amount of fringe benefits.”

From conditions (1) to (5), we identify that conditions for optimal strategy by policyholders and managers depend upon the net profits of a demutualization and their respective motive from a demutualization. The following figure, “Range of Net Profit for Best Strategy in the Base Case,” depicts the value of net profit necessary to meet conditions for best strategy by policyholders and each type of managers (Figure 3).

![Figure 3: Range of Net Profit for Best Strategy in the Base Case](image)

The top line indicates some net profit values of interest in which managers’ and policyholders’ best strategy are taken. Each solid line segment shows condition for a good manager, a bad manager and policyholders, respectively. For instance, the second line segment from the top represents the range of net profit value in which a good manager recommends a demutualization. It shows that a good manager will recommend
a conversion as long as the net profit from a demutualization is non-negative (i.e. condition (4)). The third line segment for a bad manager shows that a bad manager recommends a demutualization as long as the value of the net profit is greater than the net fringe benefit (i.e. condition (5)). The line segment for policyholder shows the range of the net profit value necessary for policyholders to accept the recommendation (i.e. condition (3)).

Hence, we have the following condition for a dominant strategy equilibrium where policyholder will be better off to accept the demutualization plan irrespective of types of managers; the net profit from a conversion must be greater than the expected agency costs (i.e. condition (3)).

We infer some conclusions from the condition for “accept” as the dominant strategy to policyholders. Policyholders need to focus their attention on the profitability of the plan and the amount of the expected agency costs from the conversion. The expected net profits must be greater than a threshold point or the expected amounts of perquisites to bad managers. Since we have the equilibrium in which both types of managers recommend a demutualization, which is in sequence accepted by policyholders, we have the pooling equilibrium for a demutualization.

In contrast, if the net profits are less than zero, \( p \pi - (1 - p)l > 0 \), then policyholders “reject” a demutualization \( (a_2) \) because they infer that the message must come from a bad manager. As a result, the bad manager becomes indifferent between sending a will-be-rejected message and not sending a message at all. Accordingly, he
will not send a message to policyholders because he knows that it will be rejected. Here, we have the case where both types of manager do not recommend a demutualization and no voting process will be necessary.

Now, we want to find conditions for a separating equilibrium where different strategies are best strategies for each type of managers. The following condition (6) shows a situation when a good manager sends the message of demutualization but a bad manager does not because policyholders will reject the recommendation. Considering the agency costs from approving bad managers’ recommendation, we have the condition for an optimal strategy for managers and policyholders.

\[
(6)\ 0 < p\pi - (1 - p)\lambda < (1 - g)e_a
\]

Condition (6) implies that the payoffs to good and bad managers in a mutual company are less than the payoff from converting so that the conversion process encourages both managers to send a message to policyholders. Condition (6) also implies that the expected payoff to policyholders from a conversion is not attractive so as to take the conversion plan so that they reject the demutualization. If the bad manager knows that policyholders will not take the recommendation, he will not send a message to policyholders because he becomes indifferent between sending a message and not doing so. If the condition (6) is satisfied, as a result, the optimal strategy for policyholders will be to “reject” recommendation even though the message is sent exclusively by good managers. In this case, policyholders do lose the opportunity to convert and to increase
their wealth level due to informational asymmetry. It should be referred to “the agency cost in a demutualization process.”

The Differential Compensation Case

It is worthwhile to consider an alternative compensation scheme for managers in a mutual company. We posit that the differential in compensations between managers in a mutual company and in a stock company alters conditions for equilibrium and it provides an incentive for policyholder to form a different compensation scheme for their managers.

Suppose that the compensation to managers in a mutual is a fixed amount \((c_M)\) while the compensation to managers in a stock is tied with the firm value or stock price such as an employee stock option plan (Figure 4). Then we have changes in payoffs to managers and policyholders when the firm remains as a mutual or fails to convert to a stock company.

---

**Figure 4: Extensive Form for the Differential Compensation Case**

- **Good** manager: \((t_1)\)
- **Bad** manager: \((t_2)\)
- Demutualization: \((m_1)\)
- Stay Mutual: \((m_2)\)
- Agree to demutualization recommendation: \((a_1)\)
- Disagree to demutualization recommendation: \((a_2)\)
- Probability of having “Good” manager: \([g]\)
- Probability of having “Bad” manager: \([1-g]\)
- Probability belief by policyholder that the “Demutualization” recommendation is from “Good” manager: \([r]\)
- Probability belief by policyholder that the “Stay-mutual” recommendation is from “Good” manager: \([q]\)
- Probability belief by policyholder that the “Stay-mutual” recommendation is from “Bad” manager: \([1-q]\)

Where \(c_M\) is a fixed compensation to managers in a mutual company, \(t_1\) “Good” type manager, \(t_2\) “Bad” type manager, \(m_1\) “Demutualization” message, \(m_2\) “Stay-mutual” message, \(a_1\) “Agree” to demutualization recommendation, \(a_2\) “Disagree” to demutualization recommendation, \([g]\) probability of having “Good” manager, \([1-g]\) probability of having “Bad” manager, \([r]\) probability belief by policyholder that the “Demutualization” recommendation is from “Good” manager, \([1-r]\) probability belief by policyholder that the “Demutualization” recommendation is from “Bad” manager, \([q]\) probability belief by policyholder that the “Stay-mutual” recommendation is from “Good” manager, and \([1-q]\) probability belief by policyholder that the “Stay-mutual” recommendation is from “Bad” manager.
The following inequalities show the condition for “accept” by policyholders to be a dominant strategy, (7), and conditions for a good manager and a bad manager, respectively, to recommend a demutualization to policyholder, (8) and (9). Since policyholders do not know the type of managers in their firm, they “accept” the demutualization only when net profits from the conversion are greater than the sum of “the expected agency costs,” \((1 - g)c_a\), and “the relative change in compensation payment,” \(\left(\frac{kV - c_M}{1 - k}\right)\).

\[ g[p(1-k)(V + \pi) + (1-p)(1-k)(V - l)] + (1-g)[p(1-k)(V + \pi - c_a) + (1-p)(1-k)(V - l - c_a)] > V - c_M \]

\[ (1-k)[p\pi - (1-p)l] - (1-k)(1-g)c_a > kV - c_M \]

\[ \Rightarrow \{p\pi - (1-p)l\} > (1-g)c_a + \left(\frac{kV - c_M}{1 - k}\right) \]

When the compensation schemes are identical between a mutual and a stock company, a good manager recommends when the demutualization is profitable. Now, she sees an opportunity to increase her wealth from the conversion. A good manager, therefore, recommends a demutualization when the net profits are greater than “the relative change in compensation benefits.”

\[ p[k(V + \pi)] + (1-p)k(V - l) > c_M \]

\[ kV + k\{p\pi - (1-p)l\} > c_M \]

\[ \Rightarrow \{p\pi - (1-p)l\} > \left(\frac{c_M - kV}{k}\right) \]
A bad manager considers not only “the relative change in compensation benefits,” \( \left( \frac{c_M - kV}{k} \right) \), but also “the net amount of fringe benefits,” \( \left( 1 - \frac{1}{k} \right) \cdot c_a \) and recommends when the net profits are greater than the addition of both benefits.

\[
\begin{align*}
p[k(V + \pi - c_a) + c_a] + (1 - p)[k(V - l - c_a) + c_a] &> c_M \\
\Rightarrow kV + k\{p\pi - (1 - p)l\} + (1 - k)c_a &> c_M \\
(9) \Rightarrow k\{p\pi - (1 - p)l\} + (1 - k)c_a &> c_M - kV \\
\Rightarrow \{p\pi - (1 - p)l\} &> \left( \frac{c_M - kV}{k} \right) + \left( 1 - \frac{1}{k} \right)c_a
\end{align*}
\]

Interestingly, finding the equilibrium satisfying conditions (7), (8) and (9) at the same time depends on the relative value between \( c_M \) and \( kV \) or the relative scale of \( k \), “the proportional compensation factor,” compared to the ratio between \( c_M \) and \( V \) (i.e. \( k \) vs. \( \frac{c_M}{V} \)). We need to consider two possible cases in terms of the relative scale of \( k \) in comparison with \( \frac{c_M}{V} \): \( k > \frac{c_M}{V} \) or \( k < \frac{c_M}{V} \).

Assuming \( k > \frac{c_M}{V} \) (accordingly, \( \frac{kV - c_M}{1 - k} > 0 \) and \( \frac{c_M - kV}{k} < 0 \)), we consider the case in which “the compensation factor \( \{k\} \)” associated with the proportional compensation in a stock company is greater than the ratio of the fixed compensation over the firm value of a mutual company. The relative significance of managerial compensation to managers in a stock company becomes relatively larger after a
conversion because the proportional compensation over the firm value is bigger compared to the relative value of a fixed compensation over the value of a mutual firm.

The following figure is a diagrammatic presentation of best strategies by policyholders and both types of managers on the horizon of net profit from a conversion (Figure 5) when we assume a fixed compensation in a mutual company, an incentive-oriented compensation in a stock company, and increasing significance of managerial compensation after a conversion. As before, each solid line segment shows condition for a good manager, a bad manager and policyholder, respectively.

\[
\begin{align*}
\left( \frac{c_a - kV}{k} \right) + \left( \frac{c_a - kV}{k} \right) &> 0 \\
\left( \frac{c_a - kV}{k} \right) &> 0 \\
\left( \frac{c_a - kV}{k} \right) &> 0 \\
\left( \frac{c_a - kV}{k} \right) &> 0
\end{align*}
\]

The change of the compensation plan gives a chance to managers to receive greater portions of firm value in salary after the conversion and it should create more incentive for managers to recommend a demutualization. As a result, the range of the net
profit in which managers optimally recommend a demutualization is wider than before (i.e. moving toward the left side on the continuum). However, conditions for policyholders to “accept” the conversion become more stringent because now they require higher net profits to make up for the incremental change of compensation to managers in addition to the expected agency costs (i.e. moving toward the right).

As seen in Figure 5, the condition for the pooling equilibrium for the demutualization is (7), which is the condition for policyholders to accept a demutualization, irrespective of the type of managers, when the plan is recommended by both types of managers.

\[
(7) \{p \pi - (1 - p)\} > (1 - g)c_a + \left( \frac{kV - c_M}{1 - k} \right)
\]

The increasing significance of managerial compensation from the conversion reduces the range of net profits in which we have the pooling equilibrium and “accept” is the dominant strategy by policyholders. The required net profit level from conversion increases from \((1 - g)c_a\) by \(\left( \frac{kV - c_M}{1 - k} \right)\) compared to the case with no change in managerial compensations.

In conclusion, in a demutualization, if policyholders launch a change of managerial compensation plan as an incentive to managers to perform for the best interest of policyholders, it actually becomes an obstacle to hinder a successful outcome of a conversion.
Also, the range of net profits for the separating equilibrium - where the good manager’s recommendation is rejected while the bad manager is indifferent - expands as we consider the differential in managerial compensations. The following range shows the condition for the separating equilibrium.

\[
\left(\frac{c_M - kV}{k}\right) < \{p\pi - (1 - p)\} < (1 - g)c_a + \left(\frac{kV - c_M}{1-k}\right)
\]

In the separating equilibrium, only the good manager recommends a demutualization and policyholders reject the recommendation. *Significantly different from the previous game, the good manager recommends the conversion even if the net profit is negative, i.e. the conversion project is not a value-increasing project, and the conversion reduces the firm value.*

Now assuming \( k < \frac{c_M}{V} \), accordingly \( \frac{kV - c_M}{1-k} < 0 \) and \( \frac{c_M - kV}{k} > 0 \), we consider the case in which the managerial compensation factor in a stock company is less than the relative amount of the fixed compensation over the firm value in a mutual company. From managers’ standpoint, the relative value of the managerial compensation becomes significantly smaller after the conversion.

The figure 6 shows the continuum of the net profits and the value of net profit necessary to meet conditions for best strategies by policyholders and both types of managers. We know that the conditions for both managers to recommend become stronger, i.e. ranges are getting narrower by moving to right, than the case with no difference in compensations because now they concern about the reduced relative value.
of their compensation in a stock company. Hence, they, both types of managers, require the higher net profits from a demutualization (i.e. the range moves to the right). Meanwhile, policyholders take the recommendation with weaker conditions, i.e. wider range, because the reduced relative value of compensation to managers may offset the expected agency costs associated with the bad manager’s recommendation.

![Figure 6: Range of Net Profit for Best Strategy in Differential Compensation Case when $k < \frac{c\mu}{V}$](image)

If $k < \frac{c\mu}{V}$, we have three relevant ranges of net profit where messages by managers and response by policyholders are determined.

1. If condition (7) for policyholders and condition (8) for good managers hold, we have the pooling equilibrium in which both types of managers will recommend demutualization and policyholders will accept.
2. If

\[
(11) \left[ \left( \frac{c_M - kV}{k} \right) + \left( 1 - \frac{1}{k} \right) \gamma_a \right] < \left[ p \pi - (1 - p) \psi \right] < \left( \frac{c_M - kV}{k} \right),
\]

then the bad manager will recommend demutualization but the good manager will not. Now policyholders should know that the message of demutualization comes only from the bad manager. Therefore, condition for the “accept” strategy by policyholders become more stringent than the case with recommendation by both types (condition \(7'\))

\[
(7') \left\{ p \pi - (1 - p) \psi \right\} > c_a + \left( \frac{kV - c_M}{1 - k} \right)
\]

3. If

\[
(9') p \pi - (1 - p) \psi < \left[ \left( \frac{c_M - kV}{k} \right) + \left( 1 - \frac{1}{k} \right) \gamma_a \right],
\]

neither type of manager offers demutualization and the firm should stay as a mutual company.

If the agency cost \(c_a\) is small and the relative change in compensation payment is large, it is indeed possible that policyholders would accept the demutualization recommended by a manager known to be bad. However, with smaller agency cost the states of world where \(11\) holds are rare because ranges of net profit where both types of managers recommend becomes merged. On contrast, bigger the agency cost makes \(11\) more likely to hold than \(9'\), but makes \(7'\) less likely to hold.
Whether we have the separating equilibrium even if the conversion is a value-decreasing project depends on the difference between the expected agency costs and the relative change in compensation benefits. If the expected agency cost is significantly higher than the incremental change in compensation to managers, a bad manager recommends a conversion to maximize her wealth level even though the conversion is not necessarily a value-increasing project. However, unlike the previous case, the good manager does not recommend a conversion when the conversion is not profitable.

Differential compensation cases provide significant suggestion to policyholders when they consider the conversion to a stock company. Presumably, demutualization by mutual companies with a fixed form of managerial compensation schedule to a stock company with an incentive-oriented managerial compensation plan should be carefully designed in terms of the salary design for managers.

If an incentive to managers is to be offered through higher relative salary compared to the firm value, it increases a level of the required net profit from a conversion and the good manager sends a dishonest message to policyholders because the extra benefit is available to her now. Also, policyholders may have a situation where they should reject the good managers’ recommendation even though the conversion itself is profitable.

If an incentive to managers is to be offered through smaller salary compared to the firm value, it decreases a level of the required net profit up to the level of compensation the good manager wants from a conversion because policyholders’ wealth position can be enhanced due to smaller managerial compensation as long as the good
manager recommends. However, policyholder should consider a possibility that the recommendation comes from the bad manager and is accepted even when the demutualization itself is not profitable, which reduces the firm value after the conversion.

*The Case where Type and Profitability are positively Correlated (Imperfect Message)*

In the “Perfect Message” case, we assume that one source of the informational asymmetry exists in terms of the honesty/sincerity of managers’ recommendation in the conversion process. Policyholders know that one type of manager has an incentive to send a demutualization message to increase his personal wealth despite the fact that the demutualization can be unprofitable in the end. Unlike this bad-type manager, a good-type manager makes always her recommendation on behalf of the firm’s policyholders so that policyholders know that agency costs are minimized whenever they receive the recommendation from the good-type manager. However, policyholders’ problem is their inability to distinguish one type of manager from the other so that they cannot always trust a manager’s recommendation.

Nevertheless, the message of a demutualization is considered to be perfect because there is no variation concerning how likely the demutualization will be profitable when a manager believes so. In other words, we do not consider the possibility that a manager is capable of increasing/decreasing the probability of a profitable demutualization. For instance, a demutualization is less likely to be profitable when a bad manager recommends or a demutualization is highly likely to be lucrative if a good manager recommends. Simply put, we eradicate the scenario in which a good manager’s effective management can increase a chance of having a profitable conversion for
policyholders. Also, we disregard the possibility that the ineptitude of a bad manager generally increase the chance of having a fruitless conversion.

In the “Imperfect Message” case, Figure 7, in addition to the assumption of different intention by managers in a demutualization process, we assume that a manager’s ability to effectively increase the profitability of demutualization varies depending on the type of the manager.

Good-type manager’s ability to augment the profitable outcome of the plan is superior to bad-type’s, i.e. $p_G > p_B$, when “$p_G$” is the probability that the demutualization is profitable with a good manager and “$p_B$” is the probability that the demutualization becomes profitable with a bad manager.
We find the following condition where the “agreement to a demutualization” is the dominant response strategy by policyholders and we have the pooling equilibrium if both types of manager send the same message, a demutualization \((m_i)\). Except for the fact that we need to consider different probabilities for each type of manager, the conditions depicts that the expected net profits need to be greater than the expected agency costs.

\[
g(1-k)[p_G(V + \pi) + (1-p_G)(V-l)] + (1-g)(1-k)[p_B(V + \pi - c_a) + (1-p_B)(V - l - c_a)] > (1-k)\psi
\]

\[
\Rightarrow (12) \ g(1-k)[V + p_G\pi - (1-p_G)\psi] + (1-g)(1-k)[V + p_B\pi - (1-p_B)\psi - c_a] > (1-k)\psi
\]

\[
\Rightarrow g[p_G\pi - (1-p_G)\psi] + (1-g)[p_B\pi - (1-p_B)\psi] > (1-g)c_a
\]

\[
\Rightarrow \{p_B\pi - (1-p_B)\psi\} + g\{(p_G - p_B)\pi - (p_B - p_G)\psi\} > (1-g)c_a
\]

When \(p_G = p_B\) in (12), we have the same situation as in the perfect message case [see condition (3)] because the probabilities are identical between two types of managers. If there is discrepancy in the probabilities, \(p_G > p_B\), then the sum of (1) the net profits of a demutualization with a bad manager, \(p_B\pi - (1-p_B)\psi\), and (2) the additional expected benefits from having a good manager, \(g\{(p_G - p_B)\pi - (p_B - p_G)\psi\}\), must be greater than the expected agency costs in the demutualization, \((1-g)c_a\).

When there are more numbers of good managers in the economy, the left hand side of the condition increases when the right hand side decreases so that the condition for policyholders to accept a demutualization weakens. As a good manager becomes more effective and a bad manager does less effective-the discrepancy between probabilities gets greater-, the condition gets weaker.
Managers’ best strategies are similar to those in the perfect message except for the probabilities of a profitably demutualization are not identical between managers. Both conditions are similar to those in a case with the identical probabilities for both types of managers.

\[ p_c k(V + \pi) + (1 - p_c) k(V - l) > kV \]

(13) \[ k \{ p_c \pi - (1 - p_c) l \} > 0 \]

\[ \Rightarrow \{ p_c \pi - (1 - p_c) l \} > 0 \]

For a good manager, the expected net profits from demutualization must be greater than zero. Obviously, the net profit should be higher than the case in the perfect message situation due to the higher probability of having profits from a demutualization, other things held equal. The higher probability of having profits creates less strict condition for a good manager to recommend a demutualization so that the good type manager feels less restrained on her recommendation.

\[ p_g [k(V + \pi - c_g) + c_g] + (1 - p_g) [k(V - l - c_g) + c_g] kV \]

(14) \[ kV + k \{ p_g \pi - (1 - p_g) l \} + (1 - k)c^g > kV \]

\[ \Rightarrow \{ p_g \pi - (1 - p_g) l \} > (1 - k)c^g \]

For a bad manager, the expected net profits must be greater than “the net amount of fringe benefits.” The net profit with a bad manager is less than the case without the probability discrepancy so that the condition for a bad manager to recommend a
demutualization becomes stringent in the imperfect message case. Again, with the higher proportion factor \( k \), stronger condition is required.

The “imperfect message” case is a special case of the “perfect message” case because conditions for optimal strategies for managers and policyholders in the “Imperfect Message” case are similar to them in the “Perfect Message” case.
Conclusion

Informational asymmetry has been the fundamental framework to explain the rational behavior of each individual in an interaction with other individuals, especially between managers and owners, as well as stockholders and bondholders in a firm. Our paper adopts the game-theoretic approach to understand the informational asymmetry problem in a demutualization process in the insurance industry.

After investigating the existing/conventional design of a demutualization process as a dynamic game with the perfect message from managers, we conclude that the existence of the informational asymmetry, in terms of the type of managers, makes the demutualization process more expensive than the case without the agency problem, if the firm converts (i.e., dominant strategy equilibrium). However, our conventional wisdom about adverse selection applies: *If the proportion of bad managers increase and the agency costs are higher, the policyholders’ decision is most likely to “reject” the conversion.* Interestingly, we find that policyholders may lose the opportunity, due to informational asymmetry concerning the type of managers, to convert the firm and to increase their wealth level.

An alternative design of demutualization was introduced to investigate the agency problem which policyholders confronted in a demutualization process, if there is discrepancy in managerial compensation before and after the conversion. We propose a fixed compensation to managers in a mutual company, and an incentive-oriented
compensation to managers in a stock company; our conclusion depends on the significance of the change in managerial compensation.

If the relative value of the compensation over the firm value increases, the required level of minimum net profit for policyholders increases by the changing compensation level compared to the case with incentive-oriented compensation to managers in both mutual and stock companies. But both types of managers become more lenient to the conversion due to increasing relative value of the compensation. However, it experiences a significant drawback. It may entice the good manager to recommend a demutualization even though the conversion itself is not profitable and the firm loses the firm value from the conversion.

If the relative value of the compensation over the firm value decreases after the conversion, the required level of net profit for policyholders decreases up to the level of compensation the good manager is satisfied with. But managers are more stringent to the conversion due to the decreasing compensation. This situation brings about different drawbacks to policyholders. Now policyholders decide to reject a good manager’s profitable recommendation, reject a bad manager’s profitable recommendation, or accept a bad manager’s unprofitable recommendation.

In our last case, unlike the perfect message case where we assume that the recommendation by managers will always be correct, we assume that manages delivers a recommendation with a chance of increasing probability of profitable conversion so that
the demutualization can be more likely profitable when it was recommended by a good manager. Again, since we assume an agency costs from taking Bad manager’s advice, the demutualization is more costly than the case without the informational asymmetry. With an additional assumption concerning differential of probability by managers, we conclude that the required level of net profits for a demutualization with a bad manager’s recommendation become higher than the one with a good manager’s, which is the same conclusion from the “Perfect Message” case.

Demutualization is a complicated process where combined claims of policyholders in a mutual company are decomposed into ownership by stockholders and promised financial compensation to customers. Game-theoretic analysis of the demutualization provides opportunities to investigate interaction among claimants to a firm. Many aspects of a demutualization have been yet studied, and our contribution is to initiate the first step for future research.
References


