



## Keio Business School

# Allocation of Control Rights: An Application to Corporate Finance

### Questions

1. In the event of default, there is a system in which the authority for decision-making of a company is transferred to creditors. Does this scheme work effectively for improving inefficient outcomes which arise due to the incompleteness of contracts?
2. Consider the relationship between financing methods and takeover defense measures by referring to the description in the main text and Appendix 2.
3. List examples of incompleteness of financial contracts and the transaction costs behind their incompleteness. How can we measure the transaction costs? (The estimated transaction costs can be referred to in management decisions.)

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## The aim of this case

The aim of this case material is to learn the concept of the property rights approach proposed by Grossman, Hart, and Moore, by taking corporate finance as an example of its application. Monetary transfer is often required to improve inefficient outcomes through ex post negotiations, but it is difficult when part of the surplus is a non-monetary benefit. Even in such a case, potentially arising situations could be improved by assigning ownership of assets among transacting parties in advance and allocating control rights in the unforeseen events. In the description of this material, some mathematical symbols are used, but there is no problem in understanding the contents without knowing those symbols. Appendices explains the Coase theorem and the Modigliani-Miller's theorem in order to complement the contents of the main text.

## 1 Introduction

When it is difficult to assume all possible contingencies that might occur and explicitly describe the conditions, rights, obligations, and actions to be observed in the case that they actually occur, ambiguous arrangements in the event of unforeseen contingencies should remain in the statements on the terms of the contract. Such situations give rise to what are called **imperfect commitments**, and contracts that are left with imperfect commitments are called **incomplete contracts**. Note that underlying the incompleteness of such contracts are not only the bounded rationality of the contracting parties but also transaction costs that are both large and various.<sup>[1]</sup>

Coase (1960) argued that when inefficient outcomes arise as a result of imperfect commitments pertaining to the provisions of a contract, compulsory provision is sometimes applied through the courts, but inefficient outcomes can also be redressed by monetary transfers or mergers by means of ex post negotiation on outcomes between the parties.<sup>[2]</sup> As a specific example of this idea, Klein et al. (1978) considered the acquisition and merger of Fisher Body by General Motors (GM), and showed that when underinvestment (hold-up problem) took place at the time of a relation-specific investment under an incomplete contract, the hold-up problem could be improved by ex post negotiation of the

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<sup>[1]</sup> Generally, costs paid by transaction parties to carry out their transactions are known as transaction costs, which are classified into information (search, collection, and transmission) costs, negotiation costs, execution costs. The transaction costs are sometimes classified into ex-ante costs and ex-post costs in view of whether they arise before or after the completion of the transaction. For more details, see the Appendix in another case material entitled "Hold-Up Problem: Underinvestment in Parts Transactions" (91-19-3216).

<sup>[2]</sup> A surplus is, broadly speaking, the value determined by subtracting any costs other than a sunk cost from the benefit that accrues to a contracting party. We say that an outcome is inefficient if the sum of the surplus (value) generated by the fulfillment of the contract is not maximized. When large costs derive from the market transaction itself, instead of procuring these in the market (by outsourcing), it is sometimes possible for companies to economize by switching to in-house production (to internalize transaction costs). Coase (1937) considered that the reason for the existence of companies lies in a resource allocation mechanism that complement market transactions in this way.

surplus generated by the relation-specific investment.<sup>[3]</sup>

The improvement of inefficient outcomes through ex post negotiations between trading parties, however, presupposes that the bargaining power of each party is commonly known to them in advance. Even if negotiations take place under the presupposition, it may not always be possible to transfer the money necessary for them to reach an efficient outcome. In particular, if part of the surplus is a non-monetary benefit, then an ex post monetary transfer becomes unfeasible.<sup>[4]</sup>

Grossman, Hart, and Moore considered that even under such a financial constraint, potentially arising situations could be improved by assigning ownership of assets among transacting parties in advance and allocating control rights in the event of unforeseen events; decision-making authorities are determined in advance, any uncertainty over bargaining power in ex post negotiations does not matter. In this case material, we discuss the problem of fund procurement by companies under a financial constraint as an applied example of the property rights approach. (The property rights approach is also a methodology to analyze the problem of “boundaries of a firm.” For more details, see Grossman and Hart (1986) and Hart and Moore (1990).<sup>[5]</sup> )

In considering contractual characteristics provided by incomplete contracts, we often draw virtual comparisons with those provided by complete contracts. A complete contract explicitly codifies contractual provisions for every possible situation. In what follows, we thus consider contracts made between a principal and an agent. A complete contract that maximizes the principal’s expected payoff (or utility) is called the **first-best contract**, while an incomplete contract that maximizes his or her expected payoff is called the **second-best contract**.

Appendix 1 explains the Coase theorem providing a concrete example, and Appendix 2 introduces the Modigliani-Miller’s theorem which is a basic theorem in corporate finance. The Coase theorem is a source of many ideas in “economics of organization” and “economic analysis of law,” and it is important to consider how to deal with cases where the prerequisites for its establishment are not satisfied, rather than its direct application to real practice. Also consider through this case material which of the conditions premised by the Modigliani-Miller’s theorem are not fulfilled in situations where the contract is incomplete.

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<sup>[3]</sup> For more details, see Klein et al. (1978) or another case material entitled “Hold-Up Problem: Underinvestment in Parts Transactions (91-19-3216). Williamson (1979) comprehensively systemized the economics of transaction costs based on concepts such as incompleteness of contracts, asset specificity, and hold-up problems, and proposed the issue of “boundaries of the firm.” A clear definition of the boundaries of a firm is one of the bases for discussions on the corporate governance.

<sup>[4]</sup> Note that, with regard to forward exchange transactions involving contingent claims and assets, ex ante monetary transfers are performed in order to achieve efficient allocation.

<sup>[5]</sup> Here, the property right approach is a research area of incomplete contract theory, and, as specified in the text, property right means control right. This terminology is, however, slightly confusing, because “residual claim” is also referred to as property right in the property right paradigm initiated by Alchian and Demsetz (1972).

## 2 Allocation of Control Rights

In the following, we show that when there exists a financial constraint that is caused by non-monetary benefits, the ex ante allocation of decision-making authority with regard to corporate management between investors, who consist of creditors and shareholders, affects the level of managers' effort, which in turn also leads to the improvement of inefficient outcomes.<sup>[6]</sup> If the amount of monetary benefits cannot be accurately proved to a court, it can also become a source of financial constraint. Let us consider the following two-period model. Timing of the decision-making is summarized as follows.

10 • Period 1: First, the manager of a company will procure the necessary funds  $K(> 0)$  from investors, who consist of creditors and shareholders. No fees are incurred in signing this contract. Next, the manager chooses a level of effort  $e$  with regard to management. Here, for the sake of simplicity, we only consider the option of whether an effort is made ( $e = 1$ ) or not ( $e = 0$ ). The effort costs  $C(> 0)$ , but this cost is not incurred when no effort is made. Investors  
15 are not able to directly observe the level of manager's effort. Instead, when earnings  $y_1$  are realized at the end of Period 1, it becomes possible for investors to observe a signal  $s$  that relates to the level of effort. All earnings are distributed to investors, but the dividends to shareholders are paid after creditors are repaid.

20 Finally, it is up to the investors to decide whether to maintain the company or to wind it up. If they choose to wind up the company, the liquidation of capital yields the settlement money  $L$ . All settlement funds are distributed to investors, but the shareholders' share is the amount that remains after creditors are repaid.<sup>[7]</sup>

25 • Period 2: If the company survives, earnings  $y_2$  is realized at the end of Period 2, at which point the manager receive non-monetary benefits  $B$ . All of the earnings are distributed to investors, but dividends to shareholders will be paid only after creditors have been repaid.

30 <sup>[6]</sup> A concept similar to property right noted here is residual claim, which is the right to determine how to use the remaining property after paying predetermined amounts to the members of an organization. In the context of a team production, Alchian and Demsetz (1972) argued that the manager of the organization for the team production could be given an incentive to monitor his or her members' contributions by pre-granting residual claims. In Alchian and Demsetz (1972), the term property right is used only twice, and the residual claim (claimant) that expresses its content more clearly is selected 20 times. However, in Alchian and Demsetz (1973), the term "property right paradigm" is used. Hart and Moore (1990) use the term property right as control right, but Grossman and Hart (1986) select the term "ownership".

35 <sup>[7]</sup> It would be possible to aim for corporate restructuring without winding up the company, but we do not consider that option here. Corporate restructuring in Japan is subject to such legislation as the Corporate Reorganization Act and Civil Rehabilitation Act. Under the former, managers will generally be dismissed as a rule and the exercise of security interests will be suspended. Under the latter, the existing managers can continue to operate and security interests can still be exercised. In either case, the company's decision-making authorities will be delegated to creditors chiefly by trustees before a restructuring plan is considered. Winding up a company will be subject to the Bankruptcy Act, and the compulsory settlement system was abolished under the terms of the enforcement of the Civil Rehabilitation Act in April 2000.

We presume that earnings distributed to investors and non-monetary benefits given to the manager in Period 2 are not discounted in Period 1, and both the manager and the investors are risk neutral. In this paper, for the sake of simplicity, we do not consider any remuneration contracts with the manager. Here, we will make the following two assumptions.

$$(a) E[y_2 | e = 0] < L < E[y_2 | e = 1], \quad (b) B - C > 0.$$

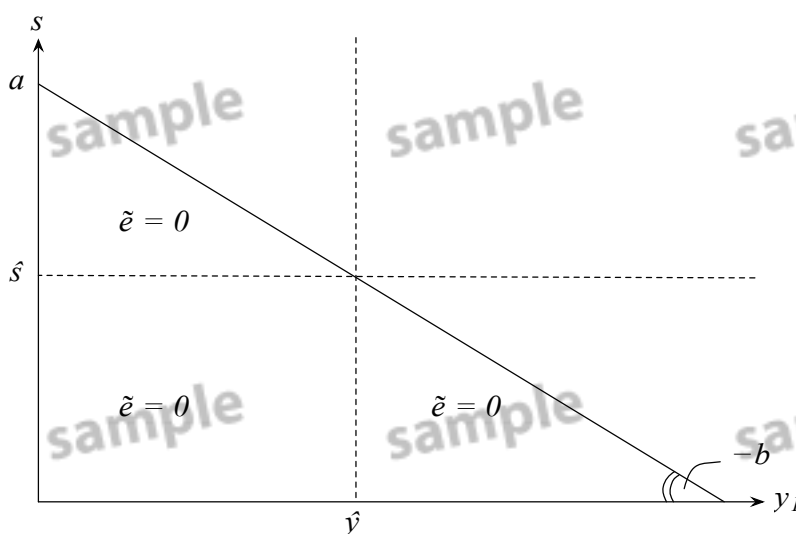
Assumption (a) implies that investors wish to elicit the level of effort  $e = 1$  from the manager, but they prefer to wind up the company at the end of Period 1 if they discover that  $e = 0$  and allow it to continue if they find that  $e = 1$ . Since earnings  $y_1$  and  $y_2$  are all distributed to investors, assumption (b) implies that the manager wishes the company to survive regardless of the level of effort he or she chooses.

The authority to decide whether to maintain or wind up the company at the end of Period 2 is set at the beginning of Period 1. The considerations underlying this setting are described in the following steps. Earnings  $y_1$  and  $y_2$  and signal  $s$  are random variables observable by both the manager and the investors. There is a higher probability of achieving high values for  $y_1$ ,  $y_2$ , and  $s$  when the level of manager's effort is  $e = 1$  than when it is  $e = 0$ . The realized values of earnings  $y_1$  and  $y_2$  are easily proved to a third party, such as a court, whereas verifying the realized value of signal  $s$  requires a considerable amount of ex post expense. Accordingly, it is not possible to write a contract that would rely solely on the realized value of  $s$ . Furthermore, at the end of Period 1, investors will not be able to adequately estimate the level of manager's effort based solely on the realized value of  $y_1$ , and thus they can only estimate it based on the realized values of  $y_1$  and  $y_2$ .

After observing the realized value of earnings  $y_1$  and signal  $s$  at the end of Period 1, investors will make the guesses about the level of manager's effort as follows. There exist thresholds  $\hat{y}$  and  $\hat{s}$  that allow investors to infer that  $e = 1$  if  $y_1 > \hat{y}$  and  $s > \hat{s}$  and that  $e = 0$  if  $y_1 < \hat{y}$  and  $s < \hat{s}$ . Also, assuming  $s = a - by_1$  is the straight line (with  $a$  and  $b$  as positive real numbers) that passes through  $(y_1, s) = (\hat{y}, \hat{s})$ , if  $y_1 < \hat{y}$  and  $s < a - by_1$  or if  $y_1 < -(s - a) / b$  and  $s < \hat{s}$ , then investors will infer that  $e = 0$ . In other words, if either  $s$  or  $y_1$  takes a value below the threshold value, then it will be judged that  $e = 0$  as long as the other does not take a correspondingly high value. With the exception of determining the coefficients  $a$  and  $b$ , it is intuitively easy to understand how such criteria are optimal. Figure 1 depicts the region where it is inferred that  $e = 0$  with  $\tilde{e} = 0$  included in order to show that this determination is based on a guess on the part of investors.

Under these criteria, by assumption (a), it is optimal at the end of Period 1 to liquidate the company if  $\tilde{e} = 0$  and survive it if  $\tilde{e} = 1$ . The reason is as follows. If the manager chooses  $e = 0$ ,  $y_1$  or  $s$  is realized with a low value, and then the manager infers that  $\tilde{e} = 0$  with high probability. If the company is liquidated because  $\tilde{e} = 0$ , then the manager cannot receive  $B - C$ . Thus, the company is liquidated if  $\tilde{e} = 0$ , while the company is made to survive if  $\tilde{e} = 1$ . At that time, the expected values of the company's profits  $y_1$  and  $y_2$  are maximized. Therefore, this is the second-best contract.

Figure 1: Anticipation on level of manager's effort.



15 Suppose that it was easy to prove to the court the realized value of signal  $s$ . Then, if  $s < \hat{s}$ , the investor would infer that  $\tilde{e} = 0$ , and thus it would be optimal to liquidate the company. This result is actually the first-best contract. The reason is the same as when we derived the second-best contract. In practice, however, the proof is very expensive, and it is not possible to write a contract that relies solely on the realization of  $s$ . At this time, in order to encourage the manager to exert effort, the criteria of investors are as shown in Figure 1, and it can be seen that there is some deviation from efficient outcomes.

Next, consider the funding methods. When the investors are all creditors, a default occurs if  $y_1 + y_2 < K$ , but this contract attains an (ex-post) efficient outcome if  $(y_1 + y_2) < K < y_1 + y_2 + B - C$ . Nevertheless,  $B$  is a non-transferable non-monetary benefit, which imposes a financial constraint, and it is impossible to make up for losses to creditors by transfer of money, and thus the second-best contract cannot be implemented. Therefore, it is necessary to consider whether the manager issues a stock and raises funds from the shareholders, which can lead to an outcome that is close to the one in the second-best contract.

The important point here is that creditors and shareholders have different preferences for the survival of companies. Denote by  $R (\geq 0)$  the remaining amount of unpaid repayment to creditors at the beginning of Period 2. When the company survives, if  $y_2 < R$ , the amount of repayment is  $y_2$  at the end of Period 2, and the creditors are not able to collect the loan. Thus, when  $E[y_2 | \tilde{e} = 0] < L \leq R$  holds, creditors prefer to liquidate the company at the end of Period 1. On the other hand, even if  $E[y_2 | \tilde{e} = 0] < R$ , there is still a possibility that the profit with  $R < y_2$  is realized at the end of Period 2. If such  $y_2$  is realized, the remaining amount after the repayment to creditors,  $y_2 - R$ , is distributed to shareholders, and thus shareholders wish to survive the company rather than creditors. Therefore, we can obtain an outcome which is closer to the pattern of decision making in the second-best contracts illustrated

in Figure 1, by giving the decision-making authority on survival of the company to creditors if  $y_1 < \hat{y}$  and to shareholder if  $\hat{y} \leq y_1$  at the end of Period 1.<sup>[8]</sup> This result means that in the event of a default, a system that transfers the authority over a company's decision-making to creditors effectively works to improve inefficient outcomes that arise due to incomplete contracts.<sup>[9]</sup>

## Appendix 1: The Coase Theorem

Imagine, for an example, a situation involving a single buyer and a single seller in the absence of an institutionalized trading market.<sup>[10]</sup> The following statement is made in this instance.

**Coase theorem** (Coase, 1960): Even assuming the presence of externalities, the externalities in question can be internalized and efficient outcomes can be derived through negotiations between the trading parties, independently of the initial state.

- This theorem implies that there are some cases in which efficient outcomes can be realized between the trading parties by the internalization of externalities, even in the absence of government regulations or mandatory statutes.
- Coase himself did not formalize what we currently call the Coase theorem, but his “idea” noted in Coase (1960) was taken as the superiority of discretionary provisions over mandatory statutes, which might be, with some misunderstanding of what he intended to mention, interpreted as a juridical version of a market-based argument or market fundamentalism against government intervention in markets.
- Prerequisites for the Coase theorem: (1) one-to-one negotiation (i.e., there is no third party), (2) clear attribution of rights, (3) the ability to codify rights and obligations as a contract, (4) symmetric information, and (5) the absence of any cost for the transaction including for the negotiation and execution of the contract.<sup>[11]</sup>

<sup>[8]</sup> It is not always possible to implement the second-best contract solely by allocating the authority for decision making. For this purpose, additional borrowing in Period 2 must be introduced, but review of the contract is not assumed in this case material.

<sup>[9]</sup> In the 1990s, many papers were written for explaining the role of organizations, institutions, and laws to improve inefficient outcomes under incomplete contracts. Maskin and Tirole (1999) argued, however, that even if some items are unverifiable to the court and there are incomplete commitments left in the provisions of contracts, we can implement the first-best contract by incorporating a relatively simple mechanism into the contract, if the trading parties are risk averse. Apart from the question of whether their mechanism is actually being used, we should take a prudent attitude in assuming the incompleteness of contracts in our analysis.

<sup>[10]</sup> Here, for “institutionalized trading market,” imagine a market such as the Tokyo Stock Exchange or the Ota Floriculture Auction. Having said that, also remember that the term “market” refers to a more abstract “place of trading” in the context of economic theory.

<sup>[11]</sup> The Coase theorem is formalized with a bargaining model from the viewpoint of game theory. The theorem does not hold if even one of these prerequisites is dropped.

### An applied example of the Coase theorem

Let us consider the following example. A wishes to play the violin. A's neighbor B finds the sound to be a nuisance (just noise for B). There are the following three possible states:

1. Not playing the violin,
2. Installing a soundproof room in which to play the violin,
3. Playing the violin without a soundproof room.

For state  $i$  ( $i = 1, 2, 3$ ), the utility for A is denoted by  $U_i$  and the damage to B is denoted by  $L_i$ . Assume that  $U_3 > U_2 > U_1$  and that  $U_1 = L_1 = 0$ . All of these are measured in monetary value. The cost of installing the soundproof room is  $C > 0$ . The cost of the installation of a soundproof room is borne by A.

In what follows, the efficiency of outcomes is measured with A's utility, B's damage, and the cost of installation of the soundproof room. Efficient allocations and their defining conditions are as follows.

(a)  $0 > U_3 - L_3$  and  $0 > U_2 - C - L_2$   
 $\Rightarrow$  "A not playing the violin" is the efficient outcome.

(b)  $U_2 - C - L_2 > U_3 - L_3$  and  $U_2 - C - L_2 > 0$   
 $\Rightarrow$  "A installing a soundproof room in which to play the violin" is the efficient outcome.

(c)  $U_3 - L_3 > U_2 - C - L_2$  and  $U_3 - L_3 > 0$   
 $\Rightarrow$  "A playing the violin without a soundproof room" is efficient outcome.

We can choose one of any states listed below as an initial state to start with to confirm the validity of Coase's idea and its implications.

- (A) B's approval is not forthcoming, and thus A is not currently allowed to play the violin.
- (B) A cannot play the violin without installing a soundproof room.
- (C) A plays the violin without regard to B's feelings on the matter.

Let us consider a negotiation result, specifying an initial state and the conditions that defines the efficient outcome. Some cases are analyzed below.



- condition (a) + initial state (A): The efficient outcome “Not playing the violin” (state 1) is initial state (A) itself.
- condition (b) + initial state (A): The efficient outcome “Installing a soundproof room in which to play the violin” (state 2) is realized.

In initial state (A), when A is asked to pay B an amount of money  $x$  for B’s permission to play the violin in a soundproof room, A is willing to pay that amount if  $x \leq U_2 - C$ ; otherwise not. (A receives  $U_1 = 0$  in initial state (A) (i.e., state 1), while he or she receives  $U_2 - C$  when moving from state 1 to state 2. Accordingly, the left-hand side of  $x \leq U_2 - C$  represents the additional loss of A associated with the state transition, while the righthand side represents the additional utility A gains.) Likewise, B is willing to accept that payment, if  $L_2 \leq x$ ; otherwise not. (By  $L_1 = 0$ , the left-hand side of  $L_2 \leq x$  represents the additional loss of B associated with the state transition, while the righthand side represents the additional utility in money B gains.) Here, we have  $L_2 < U_2 - C$  by condition (b). Thus, there exists an amount of money  $x$  that can satisfy these two conditions. Namely,  $L_2 \leq x \leq U_2 - C$ . The trading parties A and B can reach the efficient outcome from an inefficient initial state through negotiation on monetary transfer between them.

- condition (b) + initial state (C): The efficient outcome “Installing a soundproof room in which to play the violin” (state 2) is realized.

Could the problem be resolved by the payment from A to B, as above?

As compared to the case in which a soundproof room is installed, if a soundproof room is not installed, then A receives an additional utility of  $U_3 - U_2 + C$  and B incurs an additional loss of  $L_3 - L_2$ . B is not willing to accept an amount of money  $y$  unless  $L_3 - L_2 \leq y$ , while A is not willing to install a soundproof room unless  $y \leq U_3 - U_2 + C$ , A will abandon the idea of installing a soundproof room. Here, we have  $U_2 - C - L_2 > U_3 - L_3$ , by condition (b). Thus, there exists no amount of money  $y$  that can satisfy  $L_3 - L_2 \leq y \leq U_3 - U_2 + C$ .

Accordingly, it may not be that the efficient outcome (state 2) can be realized. What then?

Now, let us consider an amount of money paid from B to A, conversely. B is willing to pay  $z$  to A if  $z \leq L_3 - L_2$ , while A is willing to accept it and install the soundproof room if  $U_3 - U_2 + C \leq z$ . Here, we  $U_3 - L_3 < U_2 - C - L_2$ , by condition (b). Thus, there exists an amount of money  $z$  that can satisfy these two conditions. Namely,  $U_3 - U_2 + C \leq z \leq L_3 - L_2$ . The trading parties can eventually reach the efficient outcome from an inefficient initial state through negotiation between them.

Coase's claim (Neutrality of the initial state): If there is only one efficient allocation, its realization is independent of the initial state.

Of course, the initial state have a significant effect on the income distribution. The negotiation outcome, however, reach an efficient outcome, regardless of whether the initial state is (A), (B), or (C). Confirm by yourself whether efficient outcomes can be obtained with the other combinations of conditions and initial states. (exercise)

## Appendix 2: The Modigliani-Miller Theorem

Let us begin with the key terminology. We say that capital markets are perfect when asymmetric information and transaction costs do not exist there and that markets are complete when they determine prices of assets in every possible state of the world. Below are the well-known theorems in finance proven by Modigliani and Miller (1958) (hereafter, abbreviated to M-M).

**M-M Theorem I:** Suppose that no corporate tax is imposed and the expected return (cash flow) of a company is given in every subsequent period. Then, the value of the company does not depend on its equity ratio, when capital markets are perfect and complete.

- According to M-M Theorem I, the magnitude of capital costs (e.g., dividends, capital gains, and interest expenses) does not depend on the means of procuring capital. Accordingly, it is meaningless for companies to devise financing methods to lower capital costs. (Capital cost is the cost a company incurs to maintain and procure capital.)
- Corporate tax is not levied on interest (interest-bearing debt is a tax shield). Thus, borrowing has a lower capital cost than issuance of shares, when a corporate tax is imposed. M-M Theorem I does not hold true, when expected bankruptcy costs (i.e., additional ones such as credit loss as a result of bankruptcy) are taken into account. An optimal equity ratio (or debt ratio) exists in this case.
- The risk-adjustment behavior of investors as purchasers of securities plays an important role behind the M-M theorems, which is enabled by the basic premise that capital markets are perfect and complete. Prior to M-M, many discussions focused excessively on risk-adjustment behavior on the part of companies. What happens in imperfect capital markets? In that case, what are the consequences for financing methods? (This question is the starting point of the theory of corporate finance).

**M-M Theorem II:** Corporate value does not depend on the dividend amount in each period. (A corollary of M-M Theorem I)

- Under the assumptions for M-M Theorem 1, corporate value depends only on cash flow, and thus the dividend for each period will bear no relation to corporate value.
- In the event that information asymmetry arises between the management and investors with regard to a company's expected return, the dividend amount can serve as a "signal" indicating the prospective size of the company's future profit. (In this case, however, the level of the dividend will be higher than what would be socially efficient.) Also, when the dividend is augmented by reducing internal reserves, it is possible to prevent "managerial moral hazard." (Excess internal funds can be a hotbed of moral hazard, and can lead to lax discipline on the part of managers.) Note that it is often the case that investors do not require dividends from companies that are still growing. Growth can elicit managerial effort on the part of managers.

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