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CHANGE OF OWNERSHIP: INCENTIVES AND RULES

by Luigi Zingales (*)

Abstract

This paper analyzes the difference between private and social incentives in corporate control transfers. I show that the desire to extract a larger surplus from a potential buyer will induce agents to choose an amount of ownership that makes ex-post impossible some socially efficient changes of control. Furthermore, this inefficiency cannot be renegotiated away because of a free rider problem. This provides a rationale for a corporate law regulating acquisitions. However, I show that the most widely used rules do not achieve the social optimum. I propose a new rule that guarantees that optimum and I show why this rule may not emerge through private contracting, but needs to be imposed by fiat.

Contents

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1. Introduction[1]

The efficiency of an economic system is determined by its ability to transfer resources into the hands of the highest-value users. In capitalist economies this task is generally left to the working of decentralized markets. In fact, in the presence of well defined property rights, utility maximizing agents find it in their interest to trade goods and assets until an efficient allocation is reached. In all developed economies a particularly important role is played by the allocation of corporate ownership. Corporations control a relevant fraction of national wealth and their performance has a major impact on a country's competitiveness. Nevertheless, property rights of corporations are not so well defined. A small shareholder can transfer his cash flow rights in a company, but his decision alone cannot transfer control in that company. By contrast, a large shareholder's decision to sell his block can transfer control in spite of possible opposition by small shareholders. In other words the market for corporate control is affected by some important externality.

The purpose of this paper is to analyze the social and private optimality of alternative rules regulating control sales in a world in which ownership is endogenously chosen. Previous related papers have assumed a given ownership structure. The seminal paper on this subject is Grossman and Hart (1980). They analyze why a free-rider problem may prevent dispersedly owned companies from being transferred into the hands of the most successful managers. In a world of atomistic

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[1] I wish to thank Lucian Bebchuk, Lorenzo Caprio, Francesca Cornelli, Robert Gertner, Oliver Hart, Antony Marciano, Carlo Scarpa, and participants at the Chicago Brown Bag Lunch for their useful comments. This paper is now part of a larger research project I am undertaking with Lucian Bebchuk on the social and private incentives in the choice of ownership.

shareholders, takeovers are possible only if corporate charters allow raiders to dilute the value of an acquired company. Nevertheless, there is a divergence between private and social optimality in designing the optimal amount of dilution. While they discuss the effects of dilution on investments, they do not endogenize the dispersion of ownership. More recently Bebchuk (1993) analyzes the social optimality of different rules for control sales in the presence of a large shareholder. He also assumes an exogenously given level of ownership. A similar approach as been taken in two other relevant papers on the same subject, Caprio (1992) and Bergström and Högfeldt (1994). Both these studies analyze the impact of different rules in the presence of different ownership structure, but they do not consider the possible interaction between the choice of the level of ownership and the prevailing rule. This effect can be studied only by endogenizing the choice of the amount of ownership insiders should retain, as in Zingales (1992a). If a certain level of ownership generates some inefficiency, one should expect that rational agents will try to avoid it ex-ante or eliminate it ex-post. Furthermore, as Lucas (1976) points out, no policy recommendation can be drawn from models that do not incorporate the agent's optimal reaction to changes in the regulatory environment.

Therefore, the purpose of this paper is to study the optimal rule for control sales in a world in which ownership is chosen in a (privately) optimal way. The question of the effects of government intervention on the efficiency of the transfer of control of corporate assets is a very relevant one from an economic policy point of view. Different countries regulate control sales in very different ways. For example, in the UK the city code requires that whoever acquires control make an offer to purchase all the minority shares at the price he paid for the controlling block (so-called equal opportunity rule). A similar rule has been approved at the EEC level,

forcing all its members to follow. By contrast, in the US there is not a similar rule. Controlling blocks of shares can generally be transferred at a premium without triggering any mandatory buyout (market rule).[2] However, it is fairly common in the US, both for private and public companies, to insert into their charter a "fair price amendment". This imposes a de facto equal opportunity rule on the buyer. These differences raise some important questions. Is there an optimal rule that everyone should adopt, or does the optimal rule depend on some firm/country characteristics? And if there is a socially optimal rule, is there a difference between private and social optimality that suggests that this rule should be imposed by regulation and cannot emerge through private contracting? These are the questions this paper tries to answer.

I show that, when ownership is endogenously chosen, neither the equal opportunity rule nor the market rule has any efficiency costs, provided that insiders correctly anticipate the type of the potential buyer they will face. However, in the presence of uncertainty about the future characteristics of the potential buyer, the privately optimal level of ownership can be different from the socially optimal one and the former can prevent some efficient transfers from taking place. The intuition for this last result is very simple. In choosing the appropriate level of ownership an incumbent cares not only about maximizing the number of value-increasing transfers, but also about how much surplus he can extract from the buyer in each of those transfers. A reduced ownership of cash flow rights might achieve the latter objective, at the cost of jeopardizing some efficient transfers. While a social planner does not care about the distribution of surplus, the incumbent does. Therefore, the latter may be willing to trade off fewer value-increasing transfers against more surplus

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2 The one famous exception is the Perlman v. Feldmann case (US Co. A. 2nd Circuit 1955). In the same direction is Berle's (1958) doctrine of control as a corporate asset.

extraction.

In light of this divergence of objectives it becomes interesting to compare the role played by the equal opportunity rule and the market rule in aligning social and private incentives. Not only do I show that both rules provide a second best, but also that private incentives may select the rule that is more socially costly. Given that the two most widely used rules deliver a second best, is it possible to design a rule that guarantees the first best always? The answer is yes. A rule requiring that minority shares be auctioned off as a block, while guaranteeing them veto power in any control transaction, will realign social and private incentives. A similar law is not in the interest of the incumbent; therefore it cannot emerge through private contracting. The only drawback of the proposed rule is that it reduces the amount of surplus extracted by the incumbent. To the extent we want to stimulate entrepreneurial activity, especially in its early stage, we would like to reward it appropriately. If this additional concern is considered, then probably a simple market rule is the best solution.

The remainder of the paper proceeds as follows. Section 2 describes the framework. Section 3 presents the irrelevance results in case ownership is endogenous and the incumbent knows the buyer's characteristics. Section 4 presents the intuition for the divergence between private and social optimality and shows an example in which this divergence induces a private preference for equal opportunity rules, even if the market rule is preferable from a social point of view. Section 5 presents the optimal rule and its effects on the division of surplus. Section 6 concludes.

2. The framework

The purpose of the model is to provide a simple framework in which it is possible to analyze the choice of the optimal level of ownership and the subsequent decision whether to transfer control. The problem is interesting only if control is valuable per se, in other words, only if the controlling party enjoys, in addition to his share of cash flow rights, some private benefits, B, unique to him. These private benefits of control can be thought of as the psychic value deriving from a power position, the value of some synergies with another company owned by the controlling party, or the amount of wealth the party in control can siphon away from the company without being sued. For simplicity the model considers B independent of the amount of ownership retained by the party in control.[3] In future work I will also include the endogenous dilution case.[4] A suitable framework to analyze these decisions is provided by Zingales (1992a). He considers the decision of an entrepreneur whether to go public and derives the optimal amount of ownership in the case where the entrepreneur decides to go public. The income produced by the company consists of an observable and verifiable component v^i and by an observable but nonverifiable component B^i. At time 1, an individual or a corporation interested in buying the

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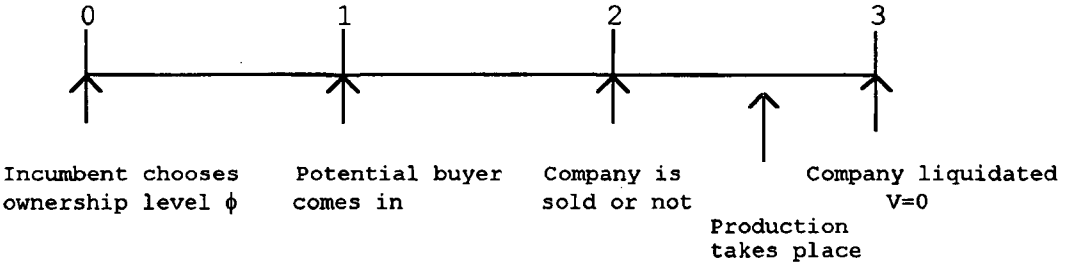
3 The third interpretation can also be included if one is willing to assume that dilution is always tolerated up to a certain limit, exogenously given. In this case whoever is in control will find it profitable to dilute minority property rights up to this level, independent of his ownership of cash flow rights.

4 Some preliminary results suggest that introducing endogenous dilution further differentiates social and private optimality. As will be clear later, the incentives of the incumbent are to separate control rights from cash flow rights to maximize his surplus. However, by so doing he increase the agency costs. The effects of the two most widely used rules are unclear. However, the first best rule proposed in Section 5 remains the first best also when this problem is considered.

company arrives. This potential buyer has different valuations of the company (v^b and B^b).[5] In this Section I assume that the buyer's characteristics are known to the incumbent at the time he chooses his ownership level. In the next Section I will consider the most realistic case in which the potential buyer's characteristics are uncertain at time 1.

Without loss of generality I assume that no production activity takes place between date 0

Fig. 1



and date 2, that the company is worthless after time 3, and that the (risk-free) interest rate is zero.

A fundamental assumption in this model is that there is some surplus from trade and that the incumbent is not able to extract it all at the bargaining stage. In other words, I assume that the market for corporate control is not perfectly competitive. This seems to be a realistic assumption. Consider, for example, that private benefits derive from a synergy with another company owned by the acquiring party. This is something very specific to one particular buyer and in this situation it seems unlikely that a seller could extract all the surplus. Furthermore, the acquisition of a

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5 I will assume that $v^{i,b}$ and $B^{i,b}$ are both social and private valuations. In other words, I disregard the possibility that, for example, the private benefits of the buyer arise from monopoly profits he can obtain at the expense of customers.

company requires the availability of large financial resources, availability generally limited to only a few wealthy individuals. Therefore, the sale of a company cannot always be conducted as a competitive auction. To the extent that there is some buyer's surplus left, the ideas exposed in this paper are relevant. It is important to remember, thus, that the effects described in this paper are important to the extent that the market for corporate control is not perfectly competitive. Therefore, these results are probably more relevant for European countries than for the United States. For simplicity I will assume that the incumbent has no bargaining power at the bargaining stage. All the main results of the paper would be unchanged had I assumed a positive bargaining power, provided this is less than 1.

Zingales (1992a) argues that it is better for the incumbent to retain the option to deviate from the one share-one vote rule. Furthermore, he proves that if the incumbent has total freedom in combining cash-flow rights and control rights, he will always prefer retaining the controlling power. In the basic model, then, I will allow total freedom in the combination of cash flow rights and voting rights. This greatly simplifies the analysis because it eliminates the discontinuity when the incumbent's ownership drops below 50 per cent. Therefore, I will indicate by ϕ the percentage of cash flow rights the incumbent chooses to retain at time 0 and he will hold at the beginning of the bargaining stage.

I also assume that everyone is risk neutral and that the buyer is not liquidity constrained. In reality entrepreneurs are both risk averse and liquidity constrained. This introduces additional reasons why control might be separated from ownership. However, in this context I wanted to isolate the main effects derived the existence of a value of control. A more realistic model should take these other effects into consideration.

3. The irrelevance result

In this Section I consider the effects of different rules on the final allocation of ownership when the incumbent anticipates the potential buyer's future characteristics. I limit my analysis to the two most widely used rules: the market rule (MR) and the equal opportunity rule (EOR).

The MR, which is equivalent to the absence of rules, allows total freedom in the transfer of a controlling block of shares. In other words a transaction will take place whenever the buyer values the control block more than the seller:

$$(1) \quad B^i+\phi v^i \leq B^b+\phi v^b,$$

where $B^{i,b}$ indicates the incumbent's (buyer's) private benefits, $v^{i,b}$ is verifiable income produced by the incumbent (buyer), and ϕ is the fraction of cash flow rights retained by the incumbent at time 2.

The EOR requires that the buyer extend an offer to all the shareholders at the same per share price paid for the controlling block.[6] Given that the incumbent will not sell his block below $B^i + \phi v^i$, the buyer has to pay an amount equal to[7]

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6 Note that here I implicitly assume that this offer should be extended to all shares independent of their voting power. This does not seem to be the case in Italy (the actual law is silent on the subject but the jurisprudence seems to agree on this).

7 For simplicity, I assume that when the buyer offers the same price to all shareholders, he can force minority shareholders to tender. Otherwise, the expected price for minority shareholders will be the maximum between $\frac{B^i+\phi v^i}{\phi}$ and v^b. Which expression is more realistic depends on the specifics of the law.

$$\phi\frac{B^i+\phi v^i}{\phi}+(1-\phi)\frac{B^i+\phi v^i}{\phi}=\frac{B^i}{\phi}+v^i.$$

Therefore, under EOR at time 2 the controlling block will change hands if and only if

$$(2)\qquad \frac{B^i}{\phi}+v^i \leq B^b+v^b.$$

Therefore, when the incumbent chooses his ownership level he will factor in whether the relevant period-2 constraint is equation (1) or equation (2). This yields the following result:

Proposition 1. If the incumbent anticipates the characteristics of the potential buyer, then a transfer of control will take place if and only if it is socially efficient, independent of the rule prevailing at time 2 (provided this is correctly anticipated).

Proof. Consider first an incumbent who initially owns 100 per cent of a company and has to choose the optimal amount of cash flow rights, ϕ, he should retain in his controlling block. From Zingales (1992a) follows that under MR,

$$\phi^{MR}=\begin{cases} 0 & \text{if } B^i \leq B^b \text{ and } v^i < v^b \\ \dfrac{B^i-B^b}{v^b-v^i} & \text{if } B^i+v^i < B^b+v^b,\ B^i > B^b \text{ and } v^i < v^b \\ 1 & \text{otherwise.} \end{cases}$$

The necessary and sufficient condition for a transfer of control under the MR is equation (1). By plugging ϕ^{MR} into (1) it is easy to verify that this always coincides with $B^i + v^i \leq B^b + v^b$, which is the condition for social optimality. Therefore, all the efficient transfer (and only them) will

take place under MR.

Following Zingales (1992a) under EOR the optimal insider ownership is[8]

$$\phi^{EOR}=\begin{cases}\dfrac{B^i}{B^b+v^b-v^i} & \text{if } B^i+v^i<B^b+v^b \\ 1 & \text{otherwise.}\end{cases}$$

The necessary and sufficient condition for a transfer of control under EOR is equation (2). By plugging ϕ^{EOR} into (2) it is easy to verify that this always coincides with $B^i + v^i \leq B^b + v^b$, which is the efficiency condition. Therefore, all the efficient transfers (and only these) will take place under EOR. □

The intuition of this result follows from Zingales (1992a). The incumbent chooses a level of ownership that helps him extract the buyer's surplus. He achieves this result by preselling part of the surplus to dispersed shareholders. In fact, dispersed shareholders are prepared to pay at time 1 the (discounted) value of what they expect to receive between 2 and 3. Therefore, if they anticipate that the incumbent will sell his block to a buyer who increases the value of their cash flow rights, they will pay the future increased value of those rights up front. At the bargaining stage, then, they have no say. This prevents the buyer from extracting any concession from them.

By starting with 100 per cent, the incumbent internalizes all possible future externality he might impose on minority shareholders. If he knows the exact type of his future potential buyer, then he will avoid being locked into

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8 In Zingales (1993) I consider the fair price amendment rule, which is a private contracting version of the EOR.

one of the inefficient situations described by Bebchuk (1993), where efficient transfers cannot take place, or inefficient transfers may take place because of the externality imposed on outside shareholders. It follows that there is no conflict between private optimum and social optimum.

Corollary 1. If the potential buyer produces at least as much cash flow as the incumbent ($v^i \leq v^b$) and his private benefits are not greater than the incumbent's ($B^i \geq B^b$), then under both rules the incumbent extracts all the buyer's surplus. Otherwise, the incumbent can extract all the buyer's surplus only under the EOR.

Proof. See Zingales (1992a). □

Corollary 1 establishes that in the vast majority of cases the two rules have no effect on the division of surplus. The EOR does better than the MR only if the private benefit component is very large. Also in this case the intuition is very simple. Under the MR the incumbent can extract more of the buyer's surplus by strategically exploiting the free riding of small shareholders. This mechanism works only to the extent that the buyer produces more cash flow rights than the incumbent. In addition, in direct bargaining the incumbent can capture the value of his private benefits. Therefore, if the potential buyer has inferior cash flow right, then the incumbent cannot extract any surplus. Otherwise the maximum amount he can extract is $B^i + v^b$.

By contrast, the EOR allows the incumbent to extract all the rival surplus. In fact, he can exploit the small shareholders' ability to free ride on the price offered to them after the change in control. This is not limited in any way by the relative size of the cash flow rights.

4. The divergence between private and social optimality

The irrelevance result is a useful benchmark, but it is not robust. In this Section I will show that it is enough to drop the assumption of perfect foresight on the buyer's characteristics to lose this result. Furthermore, I will point out that in the presence of uncertainty about the buyer's characteristics, the individually optimal choice of ownership may diverge from the socially optimal one.

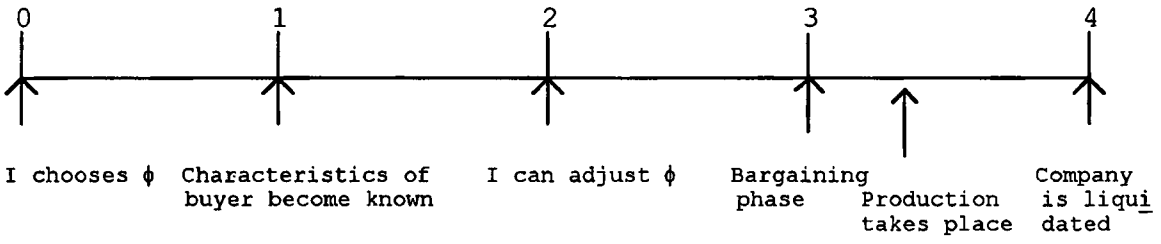
This result is reached in stages. I first illustrate what happens if, ex-post, the actual level of the incumbent's ownership is not the optimal one derived in Section 2. I show that there is a strong asymmetry: incumbents who retain more ownership than optimal can readjust their ownership through subsequent resales. In contrast, incumbents who retain fewer cash flow rights than optimal cannot readjust their ownership and implement a socially efficient transaction. This asymmetry suggests that it is always better for the incumbent to err in the direction of retaining too many rather than too few cash flow rights.

Next, I show under what scenario the incumbent might end up with the "wrong" level of ownership. If the incumbent can adjust his ownership after the buyer's type is revealed and before the bargaining phase, then the incumbent's ownership will always be at the privately optimal level. However, if the incumbent has no time to act between these two moments, then at time 1 he will face a dilemma. By retaining more ownership than necessary he guarantees the realization of a larger number of efficient transactions but, at the same time, he succeeds in extracting less surplus from each one of them. Note that the social planner cares only about the first effect but not the second one.

4.1 The effects of a "wrong" level of ownership

Consider the following modified timing where the incumbent is allowed to adjust his holdings between the resolution of uncertainty about the potential buyer's type and the bargaining phase.

Fig. 2



First consider the case in which the incumbent's ownership is above the optimal one, that is, $\phi > \phi^*$. Then it is optimal for the incumbent to sell enough cash flow rights to reach the optimal level, independent of the rule prevailing.

Proposition 2. If the incumbent is allowed to sell additional shares before bargaining with the buyer, then he will choose the optimal level of ownership indicated by Proposition 1 and the irrelevance result of Proposition 1 holds.

Proof. Let $\bar{\phi}$ be the level of initial holdings. Then, under the MR, at time 1 the incumbent maximizes

$$V=\begin{cases}\left[B^i+\phi v^i\right]+(1-\phi-\bar{\phi})v^b & \text{if } B^i+\phi v^i \leq B^b+\phi v^b \\ B^i+\bar{\phi}v^i & \text{if } B^i+\phi v^i > B^b+\phi v^b.\end{cases}$$

It then follows that the optimal ϕ is equal to ϕ^{MR} obtained in proposition 1.

Similarly, under the EOR the incumbent at time 1 maximizes

$$V=\begin{cases}(1-\bar{\phi})\left[\frac{B^i}{\phi}+v^i\right] & \text{if } \frac{B^i}{\phi}+v^i \leq B^b+v^b \\ B^i+(1-\bar{\phi})v^i & \text{if } \frac{B^i}{\phi}+v^i > B^b+v^b.\end{cases}$$

It then follows that the optimal ϕ is equal to ϕ^{EOR} obtained in proposition 1. □

The same result does not hold if the incumbent's ownership is below the optimal one at the time the buyer's characteristics become known, that is, $\phi_- < \phi^*$. If outside shareholders behave in an atomistic way, then the incumbent cannot profitably readjust his ownership to the optimal level. □

For a given level of ownership, Bebchuk (1993) proves that under the MR some efficient transfers cannot take place and some inefficient transfers may take place. By contrast, under EOR some efficient transfer may not take place, but no inefficient transfer will ever take place. The following two propositions vindicate Bebchuk's results. If the initial level of ownership is below the optimal one then his results hold even if the incumbent is allowed to trade.

Proposition 3. If the incumbent is allowed to trade before bargaining with the buyer and outside shareholders behave in an atomistic way, then inefficient transfers under the market rule cannot be avoided.

Proof. According to Proposition 1 in Bebchuk (1993), inefficient transfer of control can take place under the MR if and only if $B^b > B^i$ and $B^b - B^i > \phi(v^i - v^b)$. An inefficient transfer will be avoided if it is in the incumbent's interest to buy back enough shares from dispersed shareholders that he prefers not to sell his block to the potential buyer. In fact, if the transfer is inefficient this implies $B^i + v^i > B^b +$

v^b. Therefore, there is a $\lambda \in (0, 1 - \phi)$ such that $B^i + (\phi + \lambda)v^i > B^b + (\phi + \lambda)v^b$.

Incumbent's utility from buying back λ shares is $B^i + (\phi + \lambda)v^i - B^i - \phi v^i - \lambda P$, where P is the purchasing price. Therefore, it is in the incumbent's interest to buy back λ shares if and only if $P < v^i$.

Will outside shareholders tender at a price $P < v^i$? No. In fact, if they hold onto their shares and the buyout succeeds, they will receive v^i. Therefore, if they act in an atomistic way they prefer not tendering. As a result, it is not profitable for the incumbent to avoid inefficient transfers. □

Proposition 4. The set of efficient transfers not taking place under either the MR or the EOR is not affected by the possibility that the incumbent trades before bargaining with the buyer.

Proof. Consider first the MR case. According to Bebchuk (Corollary 2), efficient transfers will not take place if and only if $B^i > B^b$, $v^i < v^b$, and $B^i - B^b > \phi(v^b - v^i)$. This corresponds to $\phi < \frac{v^b - v^i}{B^i - B^b} = \phi^{MR}$. An efficient transfer will take place if it is in the incumbent's interest to buy back enough shares from dispersed shareholders so that it becomes in his ex-post interest to sell to the potential buyer.

I will show that this will not take place even under the best possible scenario (i.e., the incumbent repurchases all the shares and is able to extract all the buyer's surplus). Incumbent's utility will be $B^b + v^b - B^i - \phi v^i - (1 - \phi)P$, where P is thepurchasing price. Therefore, it is in the incumbent's interest to buy back shares if and only if

$$P < \frac{B^b+v^b-B^i-\phi v^i}{1-\phi}.$$

Those outside shareholders who hold onto their shares will receive v^b. Therefore, outside shareholders will tender only at $P \geq v^b$. It is immediate to show that for any $\phi < \phi^{MR}$ I have $\frac{B^b+v^b-B^i-\phi v^i}{1-\phi} < v^b$. Therefore, the incumbent cannot profitably rearrange his ownership so that all efficient transfers could take place.

Consider then the EOR case. According to Bebchuk (Corollary 5), efficient transfers will not take place if and only if $B^i > B^b$, and $B^i > \phi\ (B^b + v^b - v^i)$. This corresponds to $\phi < \frac{B^i}{B^b+v^b-v^i} = \phi^{EOR}$. Following the same steps as before one obtains that the incumbent will buy back shares if and only if

$$P < \frac{B^b+v^b-B^i-\phi v^i}{1-\phi}.$$

Outside shareholders, if they hold onto their shares, will receive the final buyout price equal to $B^b + v^b$, therefore they will tender only at $P \geq B^b + v^b$. It is immediate to show that for any $\phi < \phi^{EOR}$ I have $\frac{B^b+v^b-B^i-\phi v^i}{1-\phi} < B^b + v^b$. Therefore, the incumbent cannot profitably rearrange his ownership so that all efficient transfers could take place. □

In both cases the intuition is the same. The incumbent cannot avoid an inefficiency because of the free-rider problem. Although it was in the collective interest of outside shareholders to sell some of their shares back to the incumbent at a price that makes it convenient for him to choose the socially efficient action, this does not happen. In fact, everybody prefers leaving to somebody else the burden of

selling below the expected value of shares after the readjustment in ownership.

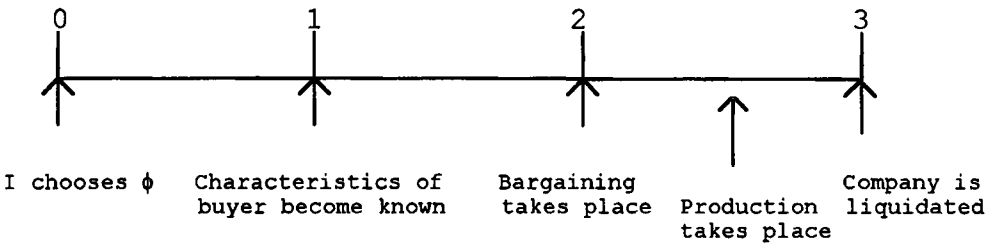
Propositions 3 and 4 are also the key to designing the socially efficient rule in Section 5. In fact, by designing a mechanism that overcomes the free-rider problem among outside shareholders one can make sure that all efficient transfers of control (and only those) will take place.

4.2 The buyer has the moving advantage

In the previous Subsection I showed that a "wrong" level of ownership cannot be corrected after the buyer's type has become known. This generates some inefficiency. However, I did not provide any explanation of why the level of ownership would be suboptimal to start with. Indeed, given the timing in Figure 2 there is no reason why the incumbent should choose an excessively low level of ownership, even in the presence of uncertainty about the buyer's type. Given that timing, it is always optimal for the incumbent to proceed at sequential sales. As proposition 2 suggests, this will guarantee the first best. Alternatively, the incumbent can also wait and sell all the shares he wants to sell at time 2. In fact, in the model there is no cost of waiting, while there is a clear cost of selling too many shares (i.e., the possibility of preventing some efficient sales). The cost of all inefficiencies is borne by the incumbent at time 1, when he chooses the initial ownership level. Therefore, when the socially optimal strategy does not involve any additional cost, the incumbent will always prefer to follow it.

The situation changes dramatically if the incumbent has no time to proceed at subsequent sales after the potential buyer's type becomes known. This corresponds to the following timing:

Fig. 3



This timing is probably more realistic. If the buyer has all the bargaining power, it is probably because he can put some pressure on the incumbent. Therefore, one can legitimately argue that this prevents the incumbent from repositioning his ownership level.

This new timing generates a trade-off between extracting more surplus and preventing efficient transfers (or allowing inefficient ones). Note that the incumbent trades off a private gain against a social loss. This trade-off is similar to the one Grossman and Hart (1980) identified in the decision on the optimal level of dilution. It is also similar to the Aghion and Bolton (1987) idea of third party contracts to extract the surplus of a future entrant in a certain product market.

Before analyzing the general case I will propose two examples that illustrate the main points of this Section. The first one shows that under both the MR and the EOR the individually optimal level of ownership may prevent some socially efficient transfers. The second result shows a case in which the private optimum under EOR is higher than the private optimum under MR; nevertheless, the choice under the MR is socially optimal while the choice under the EOR is not. While the first example shows that the private choice of ownership level might be inefficient, the second one makes the point that the private choice of rule may also be inefficient.

4.2.1 Inefficiency of privately optimal ownership levels

Consider the numerical example presented in Table 1. An incumbent with a total valuation of 150 ($B^i = 50$, $v^i = 100$) faces a prospective buyer with private benefits equal to 40 and cash flow equal to either 120 or 300 (both events are equally likely).

Tab. 1:
Example 1

Incumbent valuation	Buyer valuation	Incumbent profits under MR	Incumbent profits under EOR
$B^i = 50$	$B^b = 40$	$\phi = 0.50$, $\pi = 205$	$\phi = 5/6$, $\pi = 160$
$v^i = 100$	$v^b = \begin{cases} 120 \text{ with prob. } 0.5 \\ 300 \text{ with prob. } 0.5 \end{cases}$	$\phi = 0.05$, $\pi = 245$	$\phi = 5/24$, $\pi = 245$

If the incumbent has to choose his ownership level before the realization of the uncertainty about the buyer's type, then he has two options. Either he chooses the level of ownership optimal for the lowest type of buyer or he chooses the level optimal for the highest type (it is easy to show that all other levels are dominated). In the first case he will always transfer control to the potential buyer, but he will fail to extract all the surplus when the buyer has a higher valuation. Alternatively, he extracts all the surplus from the higher valuation buyer, but prevents a transfer of control if the buyer is of the lower type.

By using the definition of ϕ^{MR} one obtains that the first choice corresponds to $\phi = 0.50$ and the second to $\phi = 0.05$. In the first case the incumbent's profits are

$$50 + 0.5 \times 100 + 0.5\ (0.5 \times 120 + 0.5 \times 300) = 205.$$

In the second case they are

$$50 + 0.05 \times 100 + 0.95(0.5 \times 100 + 0.5 \times 300) = 245.$$

Therefore, it obvious that the incumbent will choose $\phi = 0.05$. This level of ownership prevents an efficient transfer when $v^b = 120$. In fact,

$$50 + 0.05 \times 100 > 40 + 0.05 \times 120.$$

Therefore, condition (1) is violated. Furthermore, as Proposition 3 explains, the incumbent cannot readjust his ownership to implement a socially efficient transfer of control.

Given that both types of buyers are superior to the incumbent, the socially efficient level of ownership is the one that guarantees a change of control in both cases (i.e., $\phi \leq 0.5$). The difference between social and private outcome is due to the fact that the incumbent does not internalize the amount of social surplus he is not able to appropriate.

Similarly, under the EOR the two critical levels of ownership are $\phi = 5/6$ and $\phi = 5/24$. The two corresponding levels of profit are $\Pi = 160$ and $\Pi = 245$. Therefore, the optimal choice of ownership is socially inefficient also under the EOR.

4.2.2 Private optimality of a socially inefficient rule

Consider the following alternative example presented in Table 2. The incumbent total valuation is now 110 ($B^i = 10$, $v^i = 100$), while the prospective buyer has private benefits equal to 60 and cash flow equal to either 140 or 160 (both

events are equally likely).

Tab. 2:
Example 2

Incumbent valuation	Buyer valuation	Incumbent profits under MR	Incumbent profits under EOR
$B^i = 10$	$B^b = 60$	$\phi = 0,\ \pi = 160$	$\phi = 0.1,\ \pi = 155$
$v^i = 100$	$v^b = \begin{cases} 140 \text{ with prob. } 0.5 \\ 160 \text{ with prob. } 0.5 \end{cases}$	$\phi = 0,\ \pi = 160$	$\phi = 1/12,\ \pi = 165$

In this case $\phi^{MR} = 0$ always. By contrast, ϕ^{EOR} equals either 0.1 or 1/12. Note that the total proceeds for the incumbent are larger if he can choose the EOR rather than the MR. In practice this corresponds to introducing a fair price amendment in the corporate charter.[9] Note also that if an MR is imposed, then the privately optimal level of ownership coincides with the socially optimal one. By contrast, the optimal level of ownership under EOR is socially inefficient. The lesson of the two examples above is summarized in the following proposition:

Proposition 5. Independent of the rule adopted, the individually optimal level of ownership may be socially inefficient. Furthermore, if the incumbent is free to adopt the rule he prefers, then he may sometimes adopt the more socially inefficient rule.

4.3 The general solution

This Subsection proves the inefficiency of the

9 A fair price amendment requires a bidder to pay the same price per share to all shareholders. This is equivalent to an EOR.

individual choices in the general case, where the characteristics of the buyer are distributed with a generic density function $f(B^b, v^b)$ with support on $[0, \infty] \times [0, \infty]$. Furthermore, it derives some specific comparison between the EOR and the MR when the uncertainty involves only one of the two characteristics of the buyer.

4.4 Analysis under the market rule

Control will change hands if and only if the ex-post realization of B^b and v^b satisfies equation (1). When this constraint is satisfied the proceeds for the incumbent will be $B^i + \phi v^i + (1 - \phi) v^b$. Otherwise the proceeds will be simply $B^i + v^i$. Therefore, the incumbent expected profits are

$$(3) \qquad \max \Pi = \int_0^{\infty} \int_{\frac{B^i - B^b}{\phi} + v^i}^{\infty} \left[B^i + \phi v^i + (1-\phi) v^b\right] f(B^b, v^b) dv^b dB^b + \int_0^{\infty} \int_0^{\frac{B^i - B^b}{\phi} + v^i} \left[B^i + v^i\right] f(B^b, v^b) dv^b dB^b$$

subject to $\phi \in [0,1]$. The first-order condition of the incumbent's maximization is given by

$$\frac{d\Pi}{d\phi} = \int_0^{\infty} \frac{\left(B^i - B^b\right)^2}{\phi^3} (1-\phi) f\left(B^b, \frac{B^i - B^b}{\phi} + v^i\right) dB^b + \int_0^{\infty} \int_{\frac{B^i - B^b}{\phi} + v^i}^{\infty} \left(v^i - v^b\right) f(B^b, v^b) dv^b dB^b.$$

Note that the first term is positive for $\phi \in (0,1)$ and is equal to zero for $\phi = 1$. By contrast, the second term is clearly negative if $E[v^b] > v^i$. Therefore, one can conclude that if $E[v^b] > v^i$, the optimal ownership level is below 1 ($\phi^* < 1$).

If a benevolent social planner (a rarity nowadays) could fix the incumbent's level of ownership he will do that so to maximize the number of efficient transfers of control. In other words the objective function will be

$$(4) \quad \max SW=\int_0^{\infty}\int_{\frac{B^i-B^b}{\phi}+v^i}^{\infty}\left[B^b+v^b\right]f\left(B^b,v^b\right)dv^b dB^b + \left[B^i+v^i\right]\int_0^{\infty}\int_0^{\frac{B^i-B^b}{\phi}+v^i} f\left(B^b,v^b\right)dv^b dB^b,$$

subject to $\phi\in[0,1]$. Note that while the second term of the social planner objective function is identical to the incumbent's, the first is not. In fact, the social planner cares about the entire surplus generated by the buyer, while the incumbent cares only about the fraction he is able to extract.

The first-order condition of the maximization problem is

$$\frac{dSW}{d\phi}=\int_0^{\infty}\frac{\left(B^i-B^b\right)^2}{\phi^2}\left(\frac{1}{\phi}-1\right)f\left(B^b,\frac{B^i-B^b}{\phi}+v^i\right)dB^b.$$

This derivative is always nonnegative. Therefore, the social optimum is reached at $\phi = 1$. This result is not surprising at all. In fact, the necessary and sufficient condition for a socially efficient transfer (i.e., $B^i + v^i \leq B^b + v^b$) is trivially satisfied for $\phi = 1$. A more interesting result is that the social welfare function is monotonically decreasing in ϕ. Therefore, any rule that limits the separation between control and ownership of cash flow rights is socially beneficial.

4.5 Analysis under the equal opportunity rule

Under the EOR, control will change hands if and only if the ex-post realization of B^b and v^b satisfies constraint (2). When this constraint is satisfied the proceeds for the incumbent are $\frac{B^i}{\phi} + v^i$. Otherwise the proceeds are simply $B^i + v^i$. Therefore, the incumbent's expected profits are

$$(5) \quad \max \Pi = \int_0^{\infty} \int_{\frac{B^i}{\phi} - B^b + v^i}^{0} \left[\frac{B^i}{\phi} + v^i\right] f(B^b, v^b) dv^b dB^b + \int_0^{\infty} \int_0^{\frac{B^i}{\phi} - B^b + v^i} [B^i + v^i] f(B^b, v^b) dv^b dB^b.$$

The first-order condition of the incumbent's maximization is given by

$$\frac{d\Pi}{d\phi} = \int_0^{\infty} \frac{(B^i)^2}{\phi^2} \left(\frac{1}{\phi} - 1\right) f\left(B^b, \frac{B^i}{\phi} - B^b + v^i\right) dB^b - \int_0^{\infty} \int_{\frac{B^i}{\phi} - B^b + v^i}^{\infty} \frac{B^i}{\phi^2} f(B^b, v^b) dv^b dB^b.$$

Note that the first term is positive for $\phi \in (0,1)$ and equals zero at $\phi = 1$. By contrast, the second term is clearly negative provided $B^i > 0$. Therefore, one can conclude that as long as the incumbent has positive benefits from control, then the optimal ownership level is below 1 ($\phi^* < 1$).

The social planner would maximize instead

$$(6) \quad \max SW = \int_0^{\infty} \int_{\frac{B^i}{\phi} - B^b + v^i}^{\infty} [B^b + v^b] f(B^b, v^b) dv^b dB^b + \int_0^{\infty} \int_0^{\frac{B^i}{\phi} - B^b + v^i} [B^i + v^i] f(B^b, v^b) dv^b dB^b$$

subject to $\phi \in [0,1]$.

$$\frac{dSW}{d\phi}=\int_0^{\infty}\frac{\left(B^i\right)^2}{\phi^2}\left(\frac{1}{\phi}-1\right)f\left(B^b,\frac{B^i}{\phi}-B^b+v^i\right)dB^b.$$

The derivative is always nonnegative. Therefore the optimum is reached at $\phi = 1$.

4.6 Some comparisons between the two rules

A direct comparison between the MR and the EOR in the general case is made difficult by two factors. First, under quite general hypotheses both rules represent a second best.[10]

Second, not only do the two rules determine a different level of optimal incumbent's ownership, but they also have different social costs of deviation from the optimal ownership level. Therefore, even if the social objective function in both cases is decreasing in ϕ and I am able to establish that $\phi^{MR} \leq \phi^{EOR}$, I cannot conclude that the MR is socially inferior to the EOR. In fact, the social cost of deviations from the optimal level of ownership is lower under the MR than under the EOR.

From a normative point of view the problem is resolved in the next Section where a first best rule is presented. Nevertheless, it remains interesting to compare how these two actual rules are supposed to perform. Here I present some comparisons when the uncertainty concerns just one of the two characteristics of the potential buyer and this is uniformly distributed.

Proposition 6. If the uncertainty regards only the potential

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[10] Note that the hypotheses that guarantee suboptimality of the two rules are just sufficient.

buyer's cash flow rights and these are uniformly distributed, then the MR generates less inefficiency than the EOR.

Proof. See Appendix.

The intuition is very simple. Under the MR an incumbent is penalized less if he chooses ex-ante a level of ownership that turns out ex-post to be larger than the optimal one. In fact, his total proceeds are $[B^i + \phi v^i + (1 - \phi)v^b]$. Therefore, even if ϕ was chosen for a v^b smaller than the actual one, small shareholders will capture some of the additional surplus anyway. Given that this is reflected in the price of minority shares at time 0, then the incumbent himself is able to extract some of the extra surplus anyway. By contrast, under the EOR the amount of surplus extracted is fixed at $\frac{B^i}{\phi}+v^i$, independent of the buyer's reservation value. Therefore, under the MR it is privately less costly to deviate in the direction of higher ownership. This is socially beneficial because more value-increasing transactions are made possible. Therefore, the MR is better from an efficiency point of view.

Proposition 7. If the uncertainty regards only the potential private benefits and these are uniformly distributed, then the MR generates less inefficiency than the EOR.

Proof. If $v^i \leq v^b$ then by an argument similar to one in the previous proof, the two rules prevent the same amount of socially efficient transactions. By contrast, if $v^i > v^b$ the optimal level of ownership for the incumbent is equal to 1 under the MR and to less than 1 under EOR. Therefore, the EOR performs strictly worse from an efficient point of view. □

5. The socially efficient rule

The key to finding a socially efficient rule is contained in Section 4.1. There I showed that the real reason why inefficiency cannot be resolved is due to the free riding of small shareholders. If it is possible to design a rule that overcomes this problem, then efficiency will be guaranteed independent of the initial choice of ownership made by the incumbent.

Proposed Rule. Let the parties decide whether or not to transfer control according to the MR. Then, before the transaction is implemented, minority shares are auctioned off as a block. The highest bidder who acquires the minority block is then awarded a veto right in the transaction.[11]

The three essential elements of this rule are the unification of minority shares as a block, the auction process, and the veto power. The unification is essential to avoid the free rider problem. Once this procedure is triggered, minority shareholders are forced to tender to the highest bidder and they have no ability to hold out. This element alone would be rather coercive and subject to abuses. However, the interest of minority shareholders is protected by

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11 An alternative rule that will achieve the same outcome is the following. Let the buyer make a proposal to the incumbent. If the incumbent accepts, then the transfer can take place if minority shareholders are offered the same price per share or they approve the transaction voting as a separate group. In case they oppose the transaction, the transfer of control cannot take place. If the incumbent rejects the proposal, then the interested buyer can make a bid to all shareholders for 100 per cent of the shares. In this case if the incumbent refuses to sell his stake he has to match the offer and buy out the minority shareholders at the same price. The problem with this rule is that it significantly affects the incumbent's right to dispose of his property. On this issue see also Caprio (1993).

the other two elements. First of all, their shares are sold in a competitive auction. Note that there is no contradiction in assuming that the market for corporate control is not perfectly competitive, while the market for minority shares is. In fact, minority shares have only the cash flow right component and any arbitrageur will be happy to compete in the auction as long as he is guaranteed a veto power over the transaction. This is the last key element. Once the bidder owns all the minority shares he becomes residual claimant and he has the right incentives to use the veto power.

Proposition 8. The rule proposed above guarantees social efficiency.

Proof. I show that the acquirer of the minority block will use the veto power in a socially efficient way. Remember that if he vetoes the transaction he is stuck with shares worth v^i. Therefore, he will veto all transactions in which $v^i > v^b$ unless he receives an appropriate side payment. This implies he will veto all the transactions such that

$$B^i + \phi v^i + (1 - \phi) v^i < B^b + v^b,$$

but this is exactly the socially efficient rule.

To complete the proof I need to show that in any socially efficient transaction there is a price at which the the acquirer of the minority block will be happy to sell his veto power to the potential buyer. The potential buyer is prepared to pay up to a price P such that

$$B^i + \phi v^i + (1 - \phi) P \leq B^b + v^b.$$

As long as $P > v^i$ an arbitrageur can buy the minority block and resell it at a profit. However, this condition is

satisfied whenever

$$B^i + \phi v^i + (1 - \phi) v^i < B^b + v^b,$$

which is the socially efficient rule.

Note that I did not restrict in any way the incumbent or the potential buyer from participating in the auction of minority shares. As long as third parties are allowed to bid (i.e., there is no collusion between incumbent and potential buyer) the final outcome is unchanged. □

Note also that I did not discuss the amount of surplus the acquirer of minority shares (arbitrageur) is able to extract from the potential buyer. From a social efficiency point of view this is irrelevant. As long as the arbitrageur does not behave in an atomistic way (and there is no reason why he should), efficiency is guaranteed.

However, the amount of surplus that the arbitrageur is able to extract is relevant from the incumbent's point of view and it is crucial in determining whether this rule can emerge through private contracting. The auctioning of the veto power should naturally select the arbitrageur with the highest bargaining power. As a result one should expect his bargaining power to be more than the incumbent's (in this case zero), even if probably less that that of atomistic shareholders (i.e., 1). Therefore, in the presence of the proposed rule the incumbent will lose some of its ability to extract the buyer's surplus but not all of it. Nevertheless, it is easy to construct examples such that the incumbent is better off without this proposed rule than with it.

Example: Consider Example 1, with the only difference that now transactions should take place under the proposed rule. Assume that the acquirer of the minority block is able

to extract half of the surplus thanks to his veto power. Then the incumbent total proceeds are

$$B^i + v^i + 0.5(1 - \phi)\{E[v^b | B^i + v^i \leq B^b + v^b] - v^i\}.$$

The last term is the amount of surplus the arbitrageur is able to extract from the buyer in those transactions in which $v^b > v^i$. Note that constraint (1) has disappeared because renegotiation is possible among minority shareholders and the incumbent. Therefore, all efficient transactions will take place independent of the incumbent initial ownership.

In this case the maximum profits are reached for a $\phi = 0$ and equal 205. This solution guarantees all efficient transfers but does not maximize the return of the incumbent (remember that the incumbent's proceeds under the MR were 245). Therefore, a similar rule cannot be expected to emerge through private contracting but needs to be imposed by fiat.

It is important to keep in mind that in the greater scheme of things such a rule might not necessarily be desirable. To the extent that we want to stimulate entrepreneurial activity, especially in its early stage, we would like to reward it appropriately. Allowing the incumbent entrepreneur to extract a larger fraction of the buyer's surplus is a way of obtaining that result. Therefore, a rule that substantially reduces this ability may be socially detrimental, even if it eliminates all the inefficiencies in control changes. On the other hand, further refinement of this rule may also accomplish the goal of maximizing the fraction of total surplus appropriated by the incumbent. In fact, one could design a bargaining structure between the arbitrageur and the potential buyer such that the former gets all the surplus.

6. Conclusions

In this paper I analyze the difference between private and social incentives to set up the rules that regulate corporate control transfers. After showing that the most widely used rules do not achieve the social optimum, I design a new rule that guarantees that optimum and I explain why this rule may not emerge through private contracting.

However, before actually implementing this rule some caveats are necessary. First, the need and the success of this rule depend crucially on the difference between the competitiveness of the market for control acquisitions versus the market for simple cash flow rights. The stand taken in this paper is that while the latter is perfectly competitive, the former is not. Therefore, an empirical validation of these assumptions is necessary before the need for a mandatory law is established. Second, it is important to study the case in which dilution is made endogenous. Third, and probably most important, my proposed rule does not come without costs. It substantially reduces the amount of surplus the initial entrepreneur is able to extract. Therefore, it might be desirable to stick to a plain vanilla MR (which may be integrated by some appraisal rights to avoid the case of inefficient transfer of control) rather than go to a more efficient, but also more complicated, rule. Nevertheless, if one of the two rules needs to be imposed, the MR seems to perform better.

This last result raises an interesting political economy question. Why did European governments prefer to introduce an EOR rather than a MR, when the second one seems to be more efficient? While a complete answer to this question deserves a separate study, I advance here my conjecture. Private benefits in Europe seem to be more relevant than in the US (see Zingales, 1992b, 1994). The MR performs comparatively better

when cash flow rights are more important. If private benefits of control are relatively more important (see example 2) then incumbents prefer the EOR. Therefore, European governments may have simply codified the interest of incumbent entrepreneurs (a politically powerful group) at the expense of future new entrants and at the cost of social efficiency.

Appendix

Sketch of Proof of Proposition 6

To compare the two rules it is useful to move from reasoning in terms of ownership to reasoning in terms of types of buyers that are prevented from taking over because of a certain level of ownership. Restricting the uncertainty to v^b facilitates this comparison because it establishes a one-to-one correspondence between a buyer's total valuation and his cash flow rights. Define $\bar{\chi}$ as the buyer's total valuation, which corresponds to the optimal ownership choice under EOR, and I as the incumbent total valuation (which is certain). Then a necessary condition for a maximum is

$$(\bar{\chi}-I)\, f(\bar{\chi})\, d\chi = d\chi \int_{\bar{\chi}+d\chi}^{B} f(\chi)\, d\chi,$$

where B is the upper limit of the support of f(.). The left-hand side is the surplus lost by slightly increasing the critical level of buyer's valuation. Recall that when constraint (2) is binding, then the incumbent extracts all the surplus. Therefore, the loss corresponds to the area $(\bar{\chi} - I)d\chi$ multiplied by the density function $f(\bar{\chi})$. Now compute the trade-off at the same critical level $\bar{\chi}$ under the MR. The trade-off is

$$(7) \quad -(\bar{\chi}-I)\, f(\bar{\chi})\, d\chi + d\chi + \alpha d\chi \int_{\bar{\chi}+d\chi}^{B} f(\chi)\, d\chi,$$

where $\alpha \leq 1$. The first term is equal to the left-hand side of the previous case. In fact, under both rules the effect of slightly increasing the critical level is the amount of surplus lost in the transactions of those buyers with reservation utility between $\bar{\chi}$ and $\bar{\chi} + d\chi$ times the probability of these realizations. The difference is in the

second term. By setting the critical level of valuation at $\bar{\chi}$, the EOR limits the surplus extraction at $\bar{\chi}$ for all buyers with superior valuation. That is not the case under the MR. Even if the incumbent fails to extract all the surplus he will be able to extract part of the surplus in excess of $\bar{\chi}$ thanks to the ability of small shareholders to free ride.[12] Therefore, the additional surplus extracted by increasing the threshold level from $\bar{\chi}$ to $\bar{\chi} + d\chi$ will be a smaller area than $d\chi \int_{\bar{\chi} + d\chi}^{B} f(\chi)\, d\chi$. As a result, equation (7) is negative at $\bar{\chi}$. The assumption of uniform distribution guarantees that the derivative is monotonically decreasing. This suggests that the optimal critical level of χ under the MR should be smaller than $\bar{\chi}$. In other words, the optimal level of ownership under the MR allows more socially efficient transfers than the optimal level under the EOR.

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12 Note that, given that buyers differ according to their v^b, buyers with a larger valuation will also have a larger v^b.

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