Negotiated Block Trade and Rebuilding of Trust*

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Abstract

We investigate the impact of corporate governance on customers' trust using a dynamic model of experience-goods firm. In the optimal equilibrium, customers' trust in the firm is linked to its behavior in the market for corporate control, so that the controlling shareholder has incentives to ensure high product quality while non-controlling shareholders' interests are protected. Following a trust-damaging event, turnover of the controlling share block restores customers' trust and enhances total shareholder value. Our analysis identifies an endogenous cost of corporate control, offers implications for the control premium, and provides a novel rationale for the separation of ownership and control.

JEL Classifications: L14, L15, D86

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1 Introduction

A brand name is a valuable asset to a firm, because customers' purchasing decisions are often based on their perception of the firm's image and reputation.[1] Moreover, these perceptions are likely to be associated with customers' memory of their consumption experience (Keller 1993). Customers' faith in the firm is particularly important if some dimensions of the firm's products or services are difficult to monitor and contract upon. A firm which customers find trustworthy can make more sales, charge a price premium, and thus enjoy a higher profit. When the firm loses its customers' trust, it also loses sales and profit. To build and maintain its trustworthiness, the firm's top executives must devote personal effort and spend the firm's valuable resources in establishing a history of offering high-quality products. In this paper, we consider firms that rely heavily on customers' trust in the product market, and study how turnover of ownership and the design of corporate governance structure can facilitate the firm's management of its brand value in the product market, and thereby enhance its profit and total shareholder value. To the best of our knowledge, this is the first study of the impacts of a firm's concern for customers' trust in the product market on its corporate governance structure.

It is standard in the literature to capture a seller's trustworthiness in the product market by considering a firm as a producer of experience goods.[2] A product is an experience good if customers cannot observe its product quality at the time of purchase, but their consumption experience provides public signals about the product's quality.[3] High-quality production is costly to the firm and therefore, without proper incentives, the firm will shirk on its quality, and rational customers correctly anticipate this moral hazard problem. Klein and Leffler (1981) proposed a trust mechanism, according to which if a firm continues to produce high quality goods, customers will trust the firm's management and pay a price premium for its products. Once the firm produces low quality, however, it loses the trust of its customers who now believe that the firm will produce low quality goods. They punish the firm by either asking for a large discount on its product or not purchasing from the firm, at least for some period of time. When the firm does not have perfect control over its quality, such punishment necessarily occurs with a positive probability on the equilibrium path, leading to destruction of shareholder value. The same trust mechanism is also at work in the firm's relationship with its workers, business partners, and investors. In

[1] Researchers in marketing and accounting have developed rigorous estimation techniques to assess the contribution of brand value to a firm's profit. For some notable contributions, see Simon and Sullivan (1993) and Barth, Clement, Foster and Kasznik (1998).

[2] We follow the terminology introduced by Cabral (2005) to refer to the class of models based on moral hazard in infinitely repeated interactions as models of trust and trustworthiness instead of models of reputation.

[3] Some examples of experience goods are: movies, red wines newly introduced to the market, and some consumer durables, such as a new generation of smartphone.

these relationships, labor violations, contract violations, and financial misconducts are perceived as the firm's failure to honor the trust of workers, business partners and investors, respectively. It is worthwhile to point out that while our model and analysis are cast in the firm's interaction with customers, we are using an experience-good seller as a vehicle, and our messages and findings are applicable to other relationships mentioned above.[4]

An implicit assumption of the standard trust mechanism is that the firm is owned by a single shareholder throughout the lifetime of the firm. In this paper, we revisit the trust mechanism in a setting which recognizes two commonly observed features of corporate governance: (i) in many companies there are two types of shareholders: controlling shareholders who make managerial decisions, and noncontrolling shareholders who do not; and (ii) controlling-share blocks can be traded in the market for corporate control. By simultaneously studying the firm's strategy for trust management in the product market and the design of its dynamic ownership structure, we obtain the following main findings. First, voluntary turnover of the controlling blocks can help turn around a firm's damaged relationship with customers and enhance the firm's long-run shareholder value. Second, the optimal ownership structure is the outcome of the tradeoff between managing the controlling shareholder's moral hazard and mitigating punishment in the product market.

Formally, our model is a repeated game with imperfect public monitoring augmented with voluntary player turnover, and we solve for the perfect public equilibrium that maximizes total shareholder value. In the optimal equilibrium, following a bad outcome, the controlling shareholder voluntarily sells her block of shares to a new entrepreneur through negotiation. As long as the endogenously determined negotiated price for the shares is sufficiently low, the controlling shareholder is sufficiently punished, and the fear of punishment provides him sufficient incentive to exert personal effort and spend the company's valuable resources to improve the product's quality. The low negotiated price can be sustained in equilibrium because if the controlling shareholder fails to sell her shares, customers would not believe that the firm would engage in high-quality production unless a huge discount on product price is offered. Since the new entrepreneur and the noncontrolling shareholders are not responsible for the bad outcome, once the controlling block changes hands, customers no longer have to punish the firm severely and will continue to pay a premium for the firm's product. Customers' preferential treatment of the new controlling shareholder allows the firm's relationship with customers to be repaired through the turnover of the controlling block.

The equilibrium outlined above has a number of interesting and noteworthy features. First, the gain

[4]Section 1.1 and Section 6 contain a more elaborated discussion on other applications of our theory.

from trading the controlling block arises endogenously from the product market's differential treatments of the incumbent and new controlling shareholders. Therefore, the trade of the controlling block is mutually beneficial even if all controlling shareholders (incumbent and new) are ex-ante identical. Second, by receiving a price for the controlling block in excess of what she could obtain if she stayed in control of the company, the controlling shareholder is willing to exit the firm voluntarily following a bad outcome. Third, and perhaps most importantly for the firm, the voluntary exit of the incumbent controlling shareholder mitigates the product market punishment for its bad outcome, thus enhancing the firm's profit and the values of the noncontrolling shares. This key property of the equilibrium has significant implications on the net benefit of corporate control and the design of ownership structure, which we elaborate below.

In our setting, the net benefit of corporate control consists of the following three components. First, we assume that the controlling shareholder enjoys an exogenous private benefit of control. Second, she has to incur a private effort cost in managing the firm and monitoring its product qualities. The level of effort cost incurred is assumed to be unobservable to other parties, so effort exertion is subject to a moral hazard problem. As discussed above, the moral hazard problem can be partially tackled not only by punishment in the product market, but also that in the market for corporate control. While the former punishment applies to both the controlling and noncontrolling shareholders, the latter punishment is exclusive to the controlling shareholder, and gives rise to the third component of the net benefit of control, which we call an *endogenous cost of control*. Specifically, in the optimal equilibrium, following a bad outcome, the controlling shareholder has to voluntarily sell her controlling block at a low price in order to spare the firm from product-market punishment and preserve a high profit for the firm. As a result, the noncontrolling shareholders are entitled to the entire stream of high profits, while the controlling shareholder is not, so a wedge exists between the income streams offered by a controlling share and a noncontrolling share. The endogenous cost of control is defined as the present value of this wedge.

The endogenous cost of control discussed above arises from the moral hazard problem of the controlling shareholder, and is thus distinct from the direct monitoring costs considered in the literature (most notably Maug 1998 and Bolton and von Thadden 1998). We show in Section 4 that even if the exogenous private benefit of control exceeds the private effort cost of managing the firm, the net benefit of corporate control can be negative provided that the endogenous cost of control is sufficiently large. This finding is closely related to empirical studies on control premiums, defined as the difference in values between controlling shares and noncontrolling shares. Examples of negative control premiums have been well documented in the literature. Moreover, our model predicts that the control premium is lower and more likely to be negative when a firm is performing poorly. This prediction is also consistent with empirical findings.[5]

Our model and analysis can also shed light on several empirical regularities reported in the empirical literature of negotiated block trades (for example, Barclay and Holderness 1989, 1991, Dyck and Zingales 2004, and Albuquerque and Schroth 2010). This literature has investigated how the control premium of the block trade (i.e., the per-share amount by which the controlling block is traded above the prevailing market price) varies with the observable characteristics of the trade. Our analysis reveals that the control premiums of block trades can vary inversely with the post-acquisition performance of the target firm, thus harming its noncontrolling shareholders. Moreover, the control premium can exhibit a U-shaped relationship with block size. Empirical findings, which we discuss in detail in Section 4, are consistent with these predictions.

Our model provides a rationale for partial separation of ownership and control, and sheds light on the optimal firm ownership structure. In the optimal equilibrium, when the product quality fails, controlling shares are subject to more severe punishment than noncontrolling shares. Consequently, total shareholder value can potentially be raised by converting some of the controlling shares into noncontrolling shares. In other words, the founder of the company can benefit by issuing noncontrolling shares after setting up the company. Note that despite this benefit of issuing noncontrolling shares, the total shareholder value does not monotonically increase in the fraction of noncontrolling shares. As more shares are converted into noncontrolling shares, the controlling shareholder's incentive to exert effort is weakened because she now receives a smaller share of the profit but is required to put in the same amount of managerial effort to maintain high-quality production. In our framework, the optimal share structure is the outcome of a tradeoff between managing the controlling shareholder's moral hazard problem and preserving firm value from product market punishment.

The structure of the paper is as follows. Below, we discuss the literature in economics and corporate finance pertinent to our study. In Section 2, we set up our model. Section 3 first analyzes the benchmark case in which the market for corporate control is shut down. We then study the effect of negotiated block trade on the firm's profit, and show how the product market and the market for corporate control can interact with each other in equilibrium. In Section 4, we state our model's predictions and explain their

[5] While many empirical studies have found that shares with voting rights are traded at a positive premium (see Zingales (1994) for a notable example), there are also many studies that report findings of negative control premiums. See, for example, Dyck and Zingales (2004), Albuquerque and Schroth (2010), Lease, McConnell and Mikkelson (1983), Pinegar and Ravichandran (2003), and Valero, Gomez and Reyes (2008). Barclay and Holderness (1989) and Kruse, Kyono and Suzuki (2006) study dynamics of control premiums. Section 4 contains a more detailed discussion of these and other empirical studies.

relations with the existing theoretical and empirical literature. In Section 5, we solve for the optimal ownership structure. Section 6 discusses some modelling issues and generalizations. Section 7 concludes.

1.1 Related Literature

The insight that profits from future sales incentivize sellers to engage in good behaviors dates back to the trust mechanism proposed by Klein and Leffler (1981).[6] In their model of a repeated game with perfect monitoring, if the seller cares sufficiently about the future, there exists an (subgame perfect) equilibrium in which buyers pay a premium to purchase from the seller if and only if the seller has always provided high-quality goods in the past. However, if the seller does not have perfect control over its product quality and/or other performance outcomes, as is the case in reality, poor quality/outcome occurs with positive probability and the seller must then be punished by a loss in profits (Green and Porter 1984). Empirical studies on corporate reputation have demonstrated that this trust mechanism is at work in a firm's relationship not only with its customers, but also with its employees, suppliers, business partners, and providers of financial capital. A breach of trust and a damage in reputation could arise not only from lapses in product quality (Jarrell and Peltzman 1985 and Jovanovic 2017), but also from financial misconducts, misleading product advertisements, violation of contracts with business partners, and violation of labor regulations. The associated reputational penalties are often multiple times of the direct costs.[7] Johnson, Xie and Yi (2014) find that business partners and customers punish firms alleged or revealed to have engaged in financial misconducts by terminating their business relationships or reducing their purchases. Graham, Li and Qiu (2008) and Deng, Willis and Xu (2014) show that lenders punish financial misconducts by offering tighter loan contracts (for example, higher fees, shorter maturities, and more restrictive covenants). Chava, Cheng, Huang and Lobo (2010) find that investors punish by demanding a higher rate of return in the firms' equity. For effects of other corporate misconducts, Peltzman (1981) shows that firms accused of false advertising by the Federal Trade Commission suffer significant losses in market capitalization. Atanasov, Ivanov and Litvak (2011) show that the reputational losses suffered by litigated venture capitalists is economically large, as measured by the declines in businesses. Murphy, Shrieves and Tibbs (2009) report substantial reputational losses following allegations of corporate miscon-

[6] For comprehensive surveys of the literature on trust and reputation, see Cabral (2005), and Bar-Isaac and Tadelis (2008).

[7] Karpoff, Lee and Martin (2008) find that on average, the reputational loss following a revelation of financial misrepresentation accounts for 67% of the total loss, while the legal fees and penalties account only for 9%. Moreover, they find that the loss is more severe for firms that rely more heavily on implicit contracts in their operations.

ducts that impose harm on related parties including the firms' own employees.[8,9] In light of the studies above, a typical firm often has to rely on implicit or relational contracts with multiple stakeholders, and their enforcement is governed by the trust mechanism outlined in Klein and Leffler (1981). Our theory of trust management through ownership turnover thus has applications beyond the sales of experience goods.

Building upon the seminal contribution of Klein and Leffler (1981), Kreps (1990) proposes the notion of firm, instead of its owner, as a reputation-bearer. He points out that even though a firm owner has a finite lifetime, she is motivated to maintain a good firm record because when she retires and has to sell the firm, the buyer is willing to pay a higher price if the firm has a good record. In our model, the timing of the trades is endogenous, and ownership turnover is shown to help recover a firm's performance and improve firm value, while these features are absent in Krep's model. Rob and Sekiguchi (2006) consider a setting of repeated duopoly, in which each firm produces experience goods. They study and characterize the consumer-turnover equilibrium, in which consumers penalize a firm's low-quality production by switching to the firm's competitor, and show that this equilibrium can generate higher social welfare than the case of monopoly. Despite the apparent similarity in our punishment mechanisms, our paper does not focus on reducing social inefficiency, but rather on improving firm profit and shareholder values. A key implication of our owenrship turnover mechanism is the benefit of separating control from ownership, while Rob and Sekiguchi's analysis is silent on this issue.

A motivation for large block ownership is that it is effective in overcoming a free-rider problem: while overseeing firm operations and improving firm performance benefit all shareholders, these activities involve high personal cost.[10] By assigning substantial cash-flow rights to one or a few large shareholders,

[8] Other studies have identified a positive relation between firm reputation and employees' performance. Steubs and Sun (2010) find that a better firm reputation is associated with improved labor efficiency and labor productivity. Brown, Gray, McHardy and Taylor (2015) find that the average employees' trust in the firm's management is positively associated with labor productivity.

[9] While the term "reputation" is used in this empirical literature, it is often used to refer to the concept of "trust" in our model. For example, in his survey on reputational penality, Karpoff (2012) defines reputation as "the value of the quasi-rent stream that accrues when counterparties offer favorable terms of contract because they believe the firm will not act opportunistically toward them", and state that this definition follows from the theoretical model by Klein and Leffler (1981).

[10] Empirical research on corporate ownership concentration shows that the existence of controlling shareholders in modern corporations, even in large and publicly-listed ones, is prevalent (see, La Porta, Lopez-de-Silane and Shleifer (1999) for an international study, and Gadhoum, Lang and Young (2005) and Anderson and Reeb (2003) for studies of U.S. firms). It is common for these controlling shareholders to have control rights in excess of their cash flow rights and to actively participate in management. Relatedly, Holderness, Kroszner, and Sheehan (1999) find that insiders (firm's main officers and directors), on average, owned 21 percent of the common stock of a typical firm.

they have strong incentives to engage in value-improving activities. This is the view put forth by Shleifer and Vishny (1986) and Demsetz and Lehn (1985). Bolton and Von Thadden (1998) point out that while having a large shareholder improves control of management and hence firm value, the resulting ownership concentration reduces market liquidity and hence shareholder values.[11] Maug (1998) argues that an increase in market liquidity can help overcome the free-riding problem, as it becomes easier for a large shareholder to accumulate sufficient stakes without substantially affecting the share price, and to capitalize on the private information about her own monitoring activities.[12] Burkart, Gromb and Panunzi (1997) demonstrate that a large shareholder may engage in excessive monitoring, thus hurting the ex-ante initiatives of managers.[13] While the fact that holding a controlling block can be costly because of the required monitoring effort has been recognized in the literature, our analysis identifies a novel cost of control that arises endogenously from the controlling shareholder's moral hazard problem: being responsible for overseeing management, she should be punished more severely for bad outcomes than the noncontrolling shareholders. Moreover, building on the notion that share ownership mitigates the controlling shareholder's moral hazard, we introduce a novel benefit of separation of ownership and control, and derive the optimal ownership structure in our setting.

In his seminal article, Manne (1965) suggests that the market for corporate control can incentivize incumbent managers by threatening them with the prospect of losing their job in case the firm is acquired following poor performance. Jensen and Ruback (1983) argue that control transactions, such as tender offers and proxy contests, are best viewed as relatively passive shareholders choosing among competing managerial teams. In their framework, poorly performing managers are *involuntarily* forced out of the firm, and deprived of the rent and/or private benefit associated with their job. Barclay and Holderness (1991) identify negotiated block trade as an important class of corporate control transactions by presenting empirical evidence that negotiated block trade is very often associated with extensive post-trade managerial and board turnover.[14] They point out that negotiated block trade is best viewed as corporate control events in which "activist stockholders.... buy control of a company and hire and fire management to achieve a better resource utilization". In these studies, turnover of ownership and control improves the firm's performance by making punishment for bad outcomes more severe and/or replacing poor managers

[11] Relatedly, Admati, Pfleiderer and Zechner (1994) point out that holding a large block of shares is costly to the controlling shareholder because of the increase in risk exposure. Our analysis has abstracted away from risk aversion and liquidity preference to focus on the controlling shareholder's moral hazard problem.

[12] See also Kahn and Winton (1998) for a related model with richer information structures.

[13] Pagano and Roell (1998) also show that large shareholders could overmonitor, and analyze the tradeoff involved in the design of the ownership structure in a related setting.

[14] Bethel, Liebeskind and Opler (1998) also provide evidence that block trades are corporate control events by showing that they are associated with a significantly higher rate of subsequent CEO turnover.

with more capable ones. While we also show that negotiated block trades can improve firm profit and shareholder value, turnover enhances firm profit through very different forces in our setting. In our model, the incumbent controlling shareholder exits the firm *voluntarily* following bad performance, and the associated magnitude of punishment is not made more severe in our mechanism. Moreover, the entrepreneur replacing her is *no more capable* in running the business.

Empiricial studies on negotiated block trades was initiated by Barclay and Holderness (1989, 1991). Dyck and Zingales (2004) investigate trades of controlling blocks in a large cross section of countries, with particular emphasis on factors that affect the premium and discount of the controlling blocks. Albuquerque and Schroth (2010) conduct structural estimation of the block pricing model due to Burkart, Gromb and Panunzi (2000).[15] In the theoretical literature, control transfer through negotiated block trades receives relatively little attention (compared to tender offers). Bebchuk (1994) studies the effect of different takeover laws on the efficiency of the transactions of majority blocks. Burkart, Gromb and Panunzi (2000) analyze a two-stage model of controlling-block transactions and study the effect of firm characteristics on the terms of transactions. In the first stage of their model, the incumbent and the incoming controlling shareholders engage in Nash bargaining, and a breakdown of the bargaining triggers a public tender-offer stage. Stenapov (2015) considers a similar two-stage model in a different regulatory environment, and shows that the optimal mode of transfers depends on the incoming controlling shareholder's value-creation ability. In these studies, the gain from trading the controlling block arises from the exogenous arrival of a new controlling shareholder with superior ability in generating profits for the firm and/or extracting private benefits of control. In contrast, the gain from trade in our model arises endogenously from customers' differential treatment of controlling shareholders, and this feature allows us to draw implications on the timing and pricing of the block trades. Moreover, Burkart, Gromb and Panunzi (2000) and Stenapov (2015) focus on the controlling shareholder's moral hazard in extracting private benefits of control, whereas our model considers a different moral hazard problem: the controlling shareholder has to exert costly personal effort to ensure that high-quality products are produced with high probability. The difference in the nature of the moral hazard problem leads to distinct implications for the premium at which the controlling block is traded. We discuss these implications and their empirical relevance in Section 4.

The most frequently cited benefits of separation of ownership and control include management specialization, risk-sharing, and liquidity constraints (Fama and Jensen 1983 and Shleifer and Vishny 1997). By taking into account the management of customers' trust in the product market, we identify an un-

[15] For a comprehensive survey of block ownership and transaction, see Holderness (2003).

derexplored benefit in separating ownership and control. The benefit arises because turnover of control allows punishment to be targeted on the controlling shareholder, and the firm to regain customer trust in a less costly way. As a result, provided that the controlling shareholder's moral hazard is properly managed, the total shareholder value can be increased by the issurane of noncontrolling shares.

2 Model

Players Time is discrete and infinite, $t = 1, 2, ...$ There are three kinds of players in the game: entrepreneurs, customers, and investors. All players share the same discount factor, $\delta \in (0, 1)$, across periods. There is a continuum of anonymous customers of measure one. The market is served by a monopoly firm possessing a technology to produce an experience good, the quality of which cannot be observed at the time of purchase. The monopoly firm is owned by one entrepreneur who has full control rights over the firm's business decisions, and a continuum of anonymous investors who own the company's shares, but have no control rights. We call the entrepreneur with control rights the *controlling shareholder* and the other investors the *noncontrolling shareholders*. Denote the fraction of shares owned by the controlling shareholder by θ; the remaining fraction, $1-\theta$, is dispersedly held by the noncontrolling shareholders. For now, θ is assumed to be fixed and exogenous, but in Section 5, we will endogenize θ by considering it as optimally chosen by the founder of the company. The share structure and the identity of the controlling shareholder are perfectly observable to all players.

Production Technology In every period, t, the production technology may yield two possible outcomes, $y_t \in \{0, 1\}$, with each outcome representing the utility received by customers upon consumption. The realization of the outcome is unknown to customers when they make their purchasing decisions, but it becomes publicly observable among customers after they consume the goods in period t. The probability of each outcome depends on both the monetary production cost the firm incurs, $c_t \in \{c^H, c^L\}$, and the controlling shareholder's effort choice in monitoring and managing, $e_t \in \left\{e^H, e^L\right\}$, as follows:

$$1 > \Pr\left(y_t = 1 | e_t = e^H \wedge c_t = c^H\right) \equiv p > q \equiv \Pr\left(y_t = 1 | e_t \neq e^H \vee c_t \neq c^H\right) > 0.$$

Both c_t and e_t are chosen by the controlling shareholder, and are unobservable by customers. While the effort cost e_t is privately borne by the controlling shareholders, the monetary cost c_t is borne by all shareholders. As $p < 1$ and $q > 0$, this is a game of imperfect public monitoring. Effort and monetary costs are perfect complements in the sense that both have to be high to result in a high likelihood of a good outcome; neither e^H nor c^H alone will result in a high likelihood of a good outcome. The interpretation of the production technology is that quality improvement requires purchasing expensive production inputs and providing incentives for workers (who are not explicitly modelled here). To implement high-quality production, it is also necessary for the controlling shareholder to engage in personally costly management and monitoring activities. When $e_t = e^H$ and $c_t = c^H$, we say the firm engages in *high-quality production*, even though doing so does not guarantee high quality; otherwise, we say it engages in *low-quality production*.

We do not include both effort cost and monetary cost purely for realism. In our model, these two types of costs affect the controlling shareholder's moral hazard differently. In particular, they have distinct implications for the optimal design of the ownership structure, as the controlling shareholder is responsible for the whole of the effort cost, but only a fraction of the monetary cost depending on the size of the controlling block.[16]

Payoffs Denote the price the firm charges in period t by P_t. A customer buying from the firm receives an expected payoff of $\Pr(y_t = 1) - P_t$ for that period. Noncontrolling shareholders receive the firm's profit; if all customers buy from the firm, each noncontrolling share pays $P_t - c_t$ in period t. The controlling shareholder incurs effort cost e_t and receives fraction θ of the firm's profit. In addition, she receives an exogenous private benefit of control, denoted by B.[17] Her payoff in period t is thus given by $B - e_t + \theta(P_t - c_t)$. We assume that $B - e^L > B - e^H > 0$, so that when the controlling shareholder and noncontrolling shareholders receive the same stream of income per share, the net benefit of controlling the company is positive regardless of the controlling shareholder's effort.[18] Furthermore, we assume $p - c^H > q - c^L \geq 0$.[19] This assumption ensures that even if customers hold the most pessimistic belief that the firm engages in low-quality production forever, the firm can still earn a nonnegative profit, so the values of both kinds of shares remain nonnegative.

[16] Section 5 contains a more detailed discussion on this.

[17] The assumption allows us to abstract away from the moral hazard problem of private-benefit extraction, and focus on the moral hazard problem of production monitoring. If the private benefit is partly derived from appropriating shareholders' profit, then we have $\theta V_t = B - e_t + \theta(P_t - c_t - b)$, and $U_t = P_t - c_t - b$, for some $b \leq B$. The analysis will not be qualitatively affected in this alternative setup. To see this, define $\hat{c}_t \equiv c_t + b$. Then we can express the payoffs in the same form as in our model: $\theta V_t = B - e_t + \theta(P_t - \hat{c}_t)$, and $U_t = P_t - \hat{c}_t$.

[18] It will be clear from the analysis in Section 3 that in our model, these two types of shareholders will receive the same stream of incomes when ownership turnover is not allowed, or when customers treat the incumbent and the incoming controlling shareholder symmetrically. However, when ownership turnover is allowed, they may not receive the same stream of incomes.

[19] The assumption that $p - c^H > q - c^L$ is consistent with the empirical finding of Fornell, Mithas, Morgeson and Krishnan (2006) that investment in customers' satisfaction has a significant positive impact on the company's share price. The assumption $q - c^L \geq 0$ simplifies our analysis without affecting the main message.

For the analysis to be nontrivial, it is necessary that the controlling shareholder's moral hazard problem is not too severe. Specifically, we need:

$$e^H - e^L + c^H - c^L \leq \frac{(p-q)^2}{1-q}. \tag{1}$$

We adopt this assumption throughout the paper. Since $(p-q)^2 / (1-q) < p-q$, inequality (1) implies that quality improvement is socially efficient. In fact, it means that the efficiency gain from quality improvement must be large enough for high-quality production to be sustainable.

Denote by U the present value of the expected income stream, evaluated at the beginning of the game, brought about by owning one unit of noncontrolling share (normalized by a factor of $1-\delta$). Denote by θV the present value of the expected income stream, evaluated at the beginning of the game, brought about by owning the controlling block (normalized by a factor of $1-\delta$). As θ stands for the size of the controlling block, V can be interpreted as the value of a unit of controlling share. The total (normalized) shareholder value is thus given by

$$S = \theta V + (1-\theta) U. \tag{2}$$

It will become clear in Section 5 that S is also the value of the company to the founder if she can sell noncontrolling shares to perfectly competitive investors.

Turnover of Controlling Shareholder We model negotiated trading of the controlling share block in the following way: every period an entrepreneur arrives and may purchase the entire block of shares from the incumbent controlling shareholder. After the purchase, the entrepreneur becomes the new controlling shareholder of the firm. If acquisition does not take place in a period, the potential acquirer exits forever. When acquisition occurs, it is publicly observable. However, the actual transaction price of the controlling block can neither be publicly observed nor credibly disclosed by the transacting parties. This assumption captures the notion that customers' belief (and hence strategy) does not depend on the transaction price.[20] Furthermore, we assume that the transaction price is determined by Nash bargaining, and denote the incumbent's bargaining power by $\beta \in (0,1)$.[21]

Timeline The following figure illustrates the timeline within each period:

[20] A justification is that a typical consumer does not have enough financial literacy to easily infer from the transfer price how the surplus of a corporate control transaction is split between the transacting parties. We discuss in Section 6 the alternative setting in which the transfer price is observable.

[21] In the empirical literature on negotiated block trade, Dyck and Zingales (2004) estimate that the average share of the seller's surplus is 2/3. Albuquerque and Schroth's (2010) estimate of the seller's bargaining power is between 0.67 and 0.72.

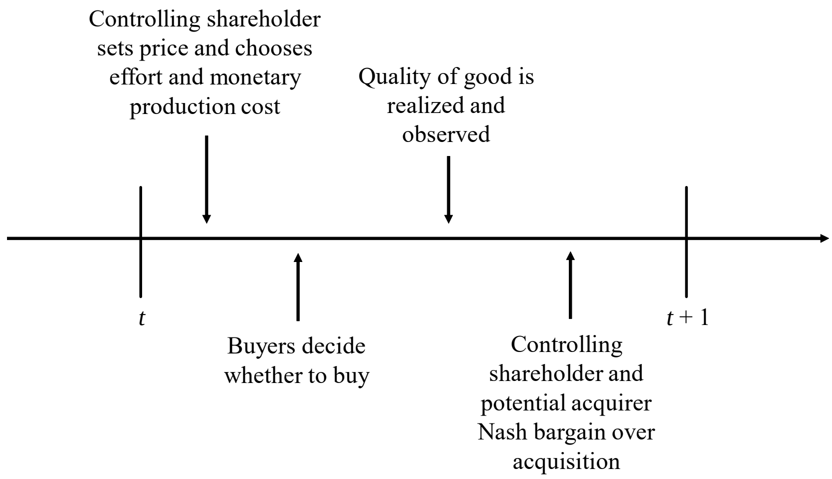

Figure 1: Timeline

Finally, we assume that except for share transactions, transfers between the controlling shareholder and noncontrolling shareholders are infeasible. The role of this assumption is to rule out the use of transfers between controlling and noncontrolling shareholders as a punishment device for bad outcomes.[22]

Equilibrium The equilibrium concept we adopt is perfect public equilibrium (PPE). In the analysis in the next section, our objective is to characterize the *optimal equilibrium,* defined as the PPE that maximizes total shareholder value defined in (2). As is typical in repeated game settings, the game that we study has a large number of equilibria if the discount factor is large enough.[23] Our focus on the equilibrium with the highest shareholder value helps illustrate, in the most transparent manner, the full potential of the ownership-turnover mechanism in preserving customers' trust in the firm and hence its profit.[24] In the subsequent analysis, we will first consider a benchmark setting in which the market for corporate control is shut down so that turnover of the controlling block is infeasible. We will then move on to the full model in which the market for corporate control is operative and explain why turnover of the controlling block can occur naturally in equilibrium. The benefit of ownership turnover is illustrated by comparing the respective optimal equilibria across these two settings.

[22] We discuss in Section 6 the practical difficulties involved in using transfers to noncontrolling shareholders as a punishment device.

[23] In particular, there always exists a PPE in which the customers believe the firm never engages in high-quality production (on and off the equilibrium paths) and therefore are willing to pay only q for its products.

[24] We will explain in Section 6 that most of our insights would remain qualitatively valid even if we consider a more general class of PPEs.

3 Analysis

3.1 Benchmark: No Transfer of Controlling Share Block

This benchmark analysis assumes that the market for corporate control is shut down, i.e., the firm's control right *cannot* be transferred. We show that incentivizing the firm to engage in high-quality production necessarily entails the destruction of its profit, which harms not only the controlling shareholder, but also noncontrolling shareholders who are not responsible for the production decision.

When the controlling shares cannot be traded, both the controlling and noncontrolling shareholders receive the present discounted value of the firm's profit stream and the values of the two classes of shares differ only due to the private benefits and effort costs:

$$V = U + \frac{B - e^H}{\theta} > U. \tag{3}$$

In this case, the control premium, given by $V - U$, is positive and equal to $\left(B - e^H\right)/\theta$.

Let W be the (normalized) value per controlling share following a bad outcome. The continuation value of the controlling block following a bad outcome is thus given by θW. The following incentive constraint ensures sufficient incentives for high-quality production by the controlling shareholder:

$$\theta V \geq (1-\delta)\left[B - e^L + \theta\left(P - c^L\right)\right] + \delta\left(q\theta V + (1-q)\,\theta W\right). \tag{4}$$

If W is strictly less than V, the controlling shareholder is penalized whenever a bad outcome is realized. Throughout our analysis, we focus on the following implementation of (on-the-equilibrium-path) punishment: a sufficiently deep discount is offered to customers for one period. It is worth noting that there exist alternative ways to implement the punishment that are payoff-equivalent to all shareholders. For instance, we can consider a punishment phase in which low quality is produced, and the firm captures the full surplus from the production of low-quality goods. To ensure that the controlling shareholder is willing to offer the required discount, any deviation will trigger the off-the-equilibrium path on which customers believe the firm perpetually engages in low-quality production, which leads to the worst continuation equilibrium payoff for the controlling shareholder. Thus, an equilibrium perfection requirement is that $W \geq \left(B - e^L\right)/\theta + q - c^L$. The proposition below states the values of shares in the optimal equilibrium without controlling-block turnover.

Proposition 1 *Suppose the turnover of the controlling block is infeasible. Suppose further that (1) holds, and* $\theta > \underline{\underline{\theta}} \equiv (1-q)\left(e^H - e^L\right)/\left[(p-q)^2 - (1-q)\left(c^H - c^L\right)\right]$. *Consider the optimal equilibrium* *and denote the corresponding total shareholder value by* $\bar{S}_0$. *Moreover, denote by* $\bar{V}_0$ *and* $\bar{U}_0$*, respectively, the value of a unit of controlling share and noncontrolling share in the optimal equilibrium.*

(i) If

$$\delta \geq \hat{\delta}(\theta) \equiv \frac{e^H - e^L + \theta\left(c^H - c^L\right)}{q\left(e^H - e^L + \theta\left(c^H - c^L\right)\right) + \theta\left(p - q\right)^2},$$

then high-quality production is sustainable, and the share values are given by:

$$\begin{aligned}
\bar{V}_0 &= \left(\frac{B - e^H}{\theta} + p - c^H\right) - \frac{1-p}{p-q}\left(\frac{e^H - e^L}{\theta} + c^H - c^L\right), \\
\bar{U}_0 &= \left(p - c^H\right) - \frac{1-p}{p-q}\left(\frac{e^H - e^L}{\theta} + c^H - c^L\right), \text{ and} \\
\bar{S}_0 &= \left(B - e^H + p - c^H\right) - \frac{1-p}{p-q}\left(\frac{e^H - e^L}{\theta} + c^H - c^L\right).
\end{aligned}$$

(ii) If $\delta < \hat{\delta}(\theta)$*, then high-quality production is not sustainable in any equilibrium.*

Proposition 1 points out that even with a high discount factor, the monopolist is unable to fully capture the expected present value of its products. This is because in order to make any sales, the highest price that it can charge its customers is their reservation value for the goods, which equals p. Moreover, whenever the firm has produced a bad outcome, which happens with a positive probability, it has to be punished by offering customers a discount even if it continues to produce at high quality. This loss in profit is similar in nature to that suffered by collusive oligopolies under imperfect public monitoring (Green and Porter 1984).

Focusing on the case of $\delta \geq \hat{\delta}(\theta)$, the first terms in $\bar{U}_0$ and $\bar{V}_0$ are, respectively, the accounting profit and the sum of accounting profit and net private benefit of control if the firm always operates in the absence of an agency problem. The second terms in $\bar{U}_0$ and $\bar{V}_0$ are the expected profits that must be destroyed to provide incentives for the controlling shareholder to improve product quality. As the destruction of profit in the optimal equilibrium is kept at the minimum level necessary for sustaining high-quality production, both $\bar{V}_0$ and $\bar{U}_0$ represent the maximum value of the respective type of shares in any equilibrium. Notice that the noncontrolling shareholders suffer the same loss in profits as does the controlling shareholder. Therefore, the necessary punishment for the controlling shareholder imposes a *negative externality* on the noncontrolling shareholders, who are not responsible for the bad outcome. Perhaps more importantly, noncontrolling shareholders do not have any moral hazard problem, so it is wasteful in terms of shareholder value to punish them for a bad outcome.

3.2 The Effect of Negotiated Block Trades

In this subsection, we allow the controlling block to be traded, and investigate the interplay between the product market and the market for corporate control in providing incentives for trust maintenance. Consider the following equilibrium, which consists of four phases: a normal phase, an on-the-equilibrium-path punishment phase, and two off-the-equilibrium-path punishment phases.

- The game begins in the normal phase. In the normal phase, the controlling shareholder sets the price at p and engages in high-quality production, i.e., exerts effort e^H and incurs monetary cost c^H on the firm's behalf. If the outcome is good, there will be no turnover of the controlling shareholder, and the game stays in the normal phase.[25] If the outcome is bad, the game switches to the on-the-equilibrium-path punishment phase.

- In the on-the-equilibrium-path punishment phase, the controlling shareholder sells the entire block of controlling shares to a new entrepreneur, through Nash bargaining, at a price T per share. The firm under the new controlling shareholder may or may not have to offer a one-period price discount on its product. The new controlling shareholder engages in high-quality production and receives a continuation payoff $\hat{W}$. The game switches back to the normal phase if the outcome in that period is good, but stays in the on-the-equilibrium-path punishment phase if the outcome is bad.

- If the Nash bargaining breaks down, then the game switches to the first off-the-equilibrium-path punishment phase in which the incumbent controlling shareholder continues to engage in high-quality production and offers a one-period price discount on its product, receiving a continuation payoff W. If the outcome in that period is good, the game switches back to the normal phase; otherwise, it switches to the on-the-equilibrium-path punishment phase.

- Any other publicly observable deviations, including a deviation from the above-mentioned punishment phases, will trigger the second off-the-equilibrium-path punishment phase in which the controlling shareholder forever engages in low-quality production and sets the price at q.

In the search for the optimal equilibrium, it is without loss of generality to focus on the class of equilibria outlined above. In our model, there are only two feasible ways of imposing punishment on the controlling shareholder for bad outcomes: (i) a cut in its product price; and (ii) an outright sale of controlling shares to the newly arrived entrepreneur at a discounted price.[26] In the benchmark analysis

[25] In Section 4, when we analyze the company's control premium, we will discuss a payoff equivalent equilibrium in which turnover also takes place following a good outcome.

[26] Here, the sale of the controlling block must be outright simply because θ is assumed to be fixed. If we do not assume θ is fixed, the optimal equilibrium may involve only a partial sale of controlling shares to the newly arrived entrepreneur while

above, we focus only on the product market punishment (i). In what follows, we demonstrate that as long as high-quality production can be supported, total shareholder value can be improved relative to the benchmark case when punishment (ii), i.e., punishment through the market for corporate control, is used to substitute punishment (i).

We first explain how the transaction price of the controlling block is determined. Recall that W is the value of a controlling share in the first off-the-equilibrium-path punishment phase, i.e., when the controlling block is retained by the incumbent controlling shareholder, and that $\hat{W}$ is the corresponding value when the controlling block is sold to the new entrepreneur. The incumbent and the new entrepreneur engage in Nash bargaining, in which the bargaining power of the incumbent is β. Thus, the transaction price per share, T, is given by:

$$T = W + \beta(\hat{W} - W). \tag{5}$$

To account for the present expected value of firm profit, note that in the PPE outlined above, every time a bad outcome is realized, the controlling block changes hands and its per-share value drops from V to $\hat{W}$. As the incumbent and new controlling shareholders derive the same exogenous private benefit of control and incur the same level of effort cost, the drop in share value is due to the loss in profit in the on-path punishment phase. This loss in profit results from a price discount offered to customers and thus impacts the values of controlling and noncontrolling shares equally. Therefore, the value of a noncontrolling share (which coincides with the present expected value of firm profit) in the normal phase can be expressed as

$$U = \left(p - c^H\right) - \delta \times (1-p) \times \frac{V - \hat{W}}{1-\delta}. \tag{6}$$

Specifically, $p - c^H$ is the firm profit in the normal phase, $1 - p$ is the probability of transiting into the on-path punishment phase in the following period, and $\frac{V-\hat{W}}{1-\delta}$ is the decrease in firm profit in the period of the on-path punishment phase.

It is immediate from (6) that whenever $\hat{W} > W$, noncontrolling shareholders benefit from the transfer of the controlling block. We show in the following proposition that by allowing the turnover of the controlling block, the value of the noncontrolling shares can be increased and the highest possible value of the noncontrolling shares, $p - c^H$, can be attained if the discount factor is large enough.

the remaining controlling shares are sold as non-controlling shares to outside investors. However, as noted in Barclay and Holderness (1989), large blocks are seldom broken up. Furthermore, the optimal equilibrium always involves an outright sale of the controlling block when θ is chosen optimally by the founder of the company, the case we analyze in Section 5.

Proposition 2 *Suppose the turnover of the controlling block is feasible. Suppose further that (1) holds, and $\theta > \underline{\underline{\theta}}$. Let $\bar{U}$ and $\bar{V}$ be, respectively, the values of noncontrolling shares and controlling shares at the beginning of the game in the optimal equilibrium. For each β and θ, there exists a $\tilde{\delta}(\beta, \theta) \in \left(\hat{\delta}(\theta), 1\right)$ such that*

(i) if $\delta \in [0, \hat{\delta}(\theta))$, then

$$\bar{U} = q - c^L \text{ and } \bar{V} = \bar{U} + \frac{B - e^L}{\theta};$$

(ii) if $\delta = \hat{\delta}(\theta)$, then

$$\bar{U} = \bar{U}_0 \text{ and } \bar{V} = \bar{V}_0;$$

(iii) if $\delta \in (\hat{\delta}(\theta), \tilde{\delta}(\beta, \theta))$, then

$$\bar{U} \in (\bar{U}_0, p - c^H) \text{ and } \bar{V} = \bar{V}_0;$$

(iv) if $\delta \in [\tilde{\delta}(\beta, \theta), 1)$, then

$$\bar{U} = p - c^H \text{ and } \bar{V} = \bar{V}_0.$$

According to part (i) of Proposition 2, if high-quality production is not sustainable in the absence of the market for corporate control, then allowing turnover of the controlling block cannot increase firm profit. This is because turnover of the controlling block cannot change the fact that the worst possible punishment payoff to the controlling shareholder is $B - e^L + \theta\left(q - c^L\right)$. However, parts (ii)-(iv) of the proposition suggest that as long as high-quality production is sustainable in the benchmark case without turnover, then turnover can improve the values of noncontrolling shares, and the size of this improvement is increasing in δ.[27] When δ is sufficiently high, specifically when $\delta \geq \tilde{\delta}(\beta, \theta)$, the firm does not have to offer discount for its goods even after a bad outcome. In this case, full profit can be achieved for all periods and noncontrolling shares attain the maximum possible value of $p - c^H$. Figure 2 depicts what the cutoff $\tilde{\delta}(\beta, \theta)$ looks like.[28]

[27] As the destruction of firm profit and the punishment on the controlling shareholder are kept at the miniumum level necessary for sustaining high-quality production, $\bar{U}$ and $\bar{V}$ represent the maximum equilibrium values for the respective type of shares.

[28] See equation (13) in the proof of Proposition 2 for the exact expression of $\tilde{\delta}$.

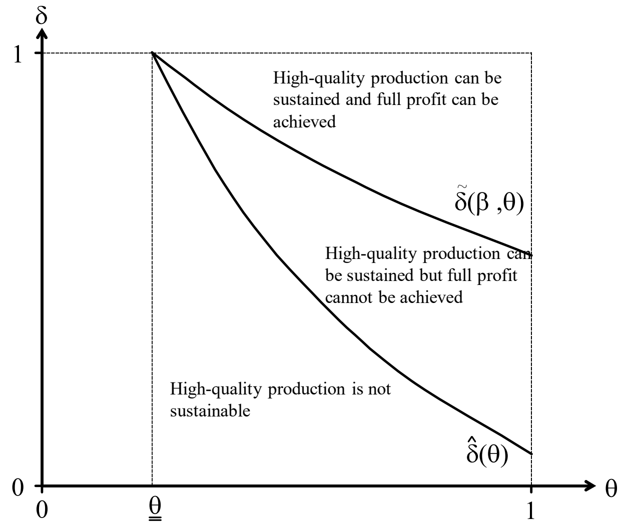

Figure 2: Cutoff values of discount factor for equilibrium with controlling-block turnover

Several remarks about the proposition and the optimal equilibrium are in order. First, although the controlling shareholder's equilibrium payoff remains unchanged, and in both cases she earns less than $B - e^H + \theta \left(p - c^H\right)$, there is a notable difference in the way that she earns that payoff. When the turnover of the controlling block is not allowed, the controlling shareholder earns her share of the firm's stream of profits, which is less than $p - c^H$ per period, because the firm has to offer a price discount to customers in the period following every bad outcome. With a turnover of the controlling block, the controlling shareholder does not capture the entire stream of firm profits because, once a bad outcome is observed, she sells her controlling shares at a discounted price. This observation is closely connected to the endogenous cost of corporate control discussed in the next section.

Second, in the optimal equilibrium, the gain from trading the controlling block arises endogenously from customers' differential treatments of the incumbent and incoming controlling shareholders. After a product failure, the incumbent controlling shareholder exits voluntarily, because had she stayed in the firm with a damaged customer relationship, the product market would impose a very severe punishment on the firm, leading to a very low continuation payoff to her. She is thus willing to sell her controlling block as long as the transaction price θT exceeds the continuation payoff θW. This is possible because the new entrepreneur is not responsible for the firm's bad outcome, and is not going to be subject to a product market punishment as severe as her predecessor. As a result, her value for the controlling block exceeds that of the incumbent. In our notation, $\theta\hat{W} > \theta W$. The voluntary nature of the incumbent's exit distinguishes our model from theories that highlight the benefit of forced termination, such as the efficiency-wage theory. In the efficiency-wage model, the principal must commit to terminate the agency relationship following poor performance, even though the termination is inefficient. In contrast, there is no contractual commitment involved in our mechanism. The product market's reaction to the change in controlling shareholder is *not* exogenously imposed. It is simply an equilibrium response: customers take optimal actions given their belief, which is consistent with the strategy employed by the controlling shareholders.

Third, both the product market and the market for corporate control impose punishment on a poorly performing controlling shareholder when the incumbent's bargaining power β is sufficiently strong. This corresponds to case (iii) of Proposition 2.[29] With strong bargaining power over the incoming controlling shareholder, the incumbent is able to capture a larger fraction of the gain from trading the controlling block. If β is too high, then to make the magnitude of punishment on the incumbent sufficiently large, it is necessary that the equilibrium gain from trading the controlling block is sufficiently small. This requires a low enough continuation payoff $\hat{W}$ for the incoming controlling shareholder after taking over the firm. Thus, the firm will still suffer a phase of low profit under the new leadership. However, the magnitude of this profit loss is lower than in the benchmark case where the market for corporate control is absent, and consequently, $\bar{U} > \bar{U}_0$.

Our analysis is related to Rob and Sekiguchi (2006)'s study on consumer-turnover equilibria in an experienece-goods duopoly market, which find that social inefficiency due to punishment of a firm failing to deliver high quality can be mitigated if the punishment is implemented by consumers switching to patronizing a different firm. This consumer-turnover mechanism, however, does not raise individual firms' profits or shareholder values, as the same magnitude of punishment for a realization of low quality has to be imposed on the firm (or otherwise it would not have incentives to produce high quality). In contrast, social welfare is not the focus of our investigation of the ownership-turnover equilibria. In fact, we have shown in Section 3.1 that social efficiency is already achieved in the benchmark setting without ownership turnover, as high quality production can be sustained in every period on the equilibrium path. The main message of our analysis of the ownership-turnover mechanism is that it can help the firm to enhance its profits and total shareholder value, as demonstrated in Proposition 2. A key element of our ownership-turnover mechanism is the creation of two classes of shares, which allows the punishment to be

[29] That is, $\delta \in (\hat{\delta}(\theta), \tilde{\delta}(\beta, \theta))$. As $\tilde{\delta}(\beta, \theta)$ is increasing in β, this case arises if β is large enough. As we will show in Section 5 below, this can be the relevant parameter case when the ownership structure, i.e., the value θ, is chosen optimally to maximize total shareholder value.

concentrated on the controlling shareholder, while sparing the noncontrolling shareholders. In the special case where the controlling shareholder owns 100 percent of the shares, equilibria with ownership turnover still exist, but the total shareholder value in these equilibria is no higher than its counterpart with no ownership turnover. Rob and Sekiguchi (2006)'s analysis is, however, silent on the effects of corporate ownership structure on trust maintenance in the product market.

4 Empirical Implications

This section provides a detailed account of the testable implications of our model and discusses the relevant empirical evidence. First, we discuss when the trade of the controlling block is predicted to occur, and its effects on firm performance. Next, we consider the control premium, i.e., the amount by which a controlling share is valued above a noncontrolling share, and explore our model's implications for how it varies with other observable variables. We conclude this section with a discussion of some real-world cases of ownership turnover.

4.1 Causes and Consequences of Turnover

Our theory predicts that a poor firm performance can be a trigger to the turnover of the controlling block, and the turnover helps improve the firm's profit. Recall in the equilibrium we characterize in the previous section, a gain from trading the controlling block emerges only after the realization of a bad outcome. This implies that controlling-block transactions are more likely to occur after lapses in product quality, or more generally, after events that erode the trust in the firm's management by important stakeholders, such as revelation of financial misconducts. In reality, the turnover of the controlling block typically involves friction and takes time to complete, so we would expect that the firm experiences a drop in its earning and market value immediately after a lapse in product quality. The firm value would remain low until the takeover by a new controlling shareholder, which would facilitate the recovery of customers' trust and hence the firm value.

There is a large body of empirical evidence suggesting that poor firm performance (such as poor stock performance, earnings, or scandals) is positively correlated with replacement of the controlling shareholder and top executives. Barclay and Holderness (1989, 1991) and Bethel, Liebeskind and Opler (1998) show that block trades are more frequently preceded by poor company performance. Martin and McConnell (1991) report that poor firm performance is correlated with a change in firm ownership and subsequent managerial replacement. Volpin (2002) find that changes in the controlling shareholder and top executives are associated with a worse past performance of the firm.[30] Bernile and Jarrell (2009) find that firms involved in option backdating scandals suffer a loss of investors' confidence in the firms' management and are much more likely to become takeover targets. Murphy, Shrieves and Tibbs (2009) report that firms that faced allegations in corporate misconducts suffered reputational penalties in the form of losses in firm values, and a significant number of these firms had undergone changes in ownership and/or management. Jovanovic (2017) shows that product recall hurts a firm's reputation, leading to a large reduction in firm value, and oftentimes a change in ownership.

It has been well-documented that firm performance often experiences notable improvement after block trades. Barclay and Holderness (1991) find that abnormal stock returns of firms one year after block trades occurred were significantly positive. Bethel, Liebeskind and Opler (1998) find that firms experienced significant improvements in operating performance and profitability two to three years after block trades occurred. Kang and Kim (2008) report significant improvement in operating incomes of target firms over one to five years following block trades with local acquirers.[31] A closely related prediction is that an announcement of a turnover of the controlling block is good news for the firm's profit, so noncontrolling share values would exhibit an immediate positive response. Consistent with this prediction, Barclay and Holderness (1991), Bethel, Liebeskind and Opler (1998), Park, Selvili and Song (2008), and Albuquerque and Schroth (2010) report that the average abnormal return of the firms' stocks in short windows around the dates of block trades is significantly positive.[32]

In our model, the gain from trading the controlling block exists, and the subsequent improvement in the firm's profit occurs, even if the incoming and the incumbent controlling shareholder possess identical ability in managing the firm. While it is certainly true that many cases of successful management (or ownership) turnover in reality can be attributed to better management under the new leadership, our theory points out that superior management ability is not necessary for a successful turnover. Specifically, the equilibrium that we characterize has the feature that even though the new controlling shareholder is no better at running the company than the incumbent controlling shareholder, we still see an improvement in the firm's performance following a turnover of controlling shareholder. In fact, a number of empirical studies have found that strategic change is often not an integral part of turnaround (for example, see Hambrick and Schecter 1983, Robbins and Pearce II 1992, and Kanter 2003). Our theory provides

[30]Goodstein and Boeker (1991) and Kaplan (1994) show that turnover of the management board increases significantly with poor performance. See also Kato and Long (2006) and Gao, Harford and Li (2017) for similar findings for executive turnover. These studies also report improvement in firm performance after turnover of the top management.

[31]Kang and Kim (2008) pointed out that geographical proximity of the controlling shareholders can facilitate monitoring of the target firm's management.

[32]The average abnormal returns found are 14%, 15.7%, 17.6% and 19% in the respective samples of these articles.

an explanation for changes in control in those cases in which "the potential benefits from changing blockholders are less apparent", as described in Barclay and Holderness (1991).

4.2 Control Premium

The control premium is defined as the difference between the market value of a controlling share and that of a noncontrolling share; in our notation, it is given by $V - U$. In this subsection, we first point out that our model identifies an endogenous cost of corporate control. We then show that because of it, the control premium is lower and more likely negative if the firm has recently suffered from a poor performance. Next, our model's prediction of the negative correlation between the control premium and the firm's post-acquisition performance improvement is explained. Finally, we discuss how the control premium varies with the size of the controlling block and the distribution of bargaining powers.

4.2.1 Endogenous cost of corporate control and negative control premium

In our model, although both controlling and noncontrolling shares are entitled to identical cash-flow rights, their market value can differ for the following two reasons. First, the controlling shareholder derives a private benefit of control B, but has to bear an effort cost which equals e^H in equilibria with high-quality production. We assume that the net private benefit of control per share $\left(B - e^H\right)/\theta$ is nonnegative. Second, the controlling shareholder has to bear an *endogenous cost of corporate control* that arises because she must be punished following a bad outcome, while the noncontrolling shareholders either do not have to be punished (if $\delta \geq \tilde{\delta}(\beta, \theta)$), or they are punished less severely than the controlling shareholder when they have to be punished (if $\delta \in (\hat{\delta}(\theta), \tilde{\delta}(\beta, \theta))$).

More specifically, the control premium in our model can be expressed as follows. During good times, the values of controlling and noncontrolling shares are given, respectively, by $\bar{V}$ and $\bar{U}$.[33] Using Proposition 2, the firm's control premium during good times, denoted by Δ^H, can be decomposed as follows:

$$\Delta^H = \underbrace{\frac{B - e^H}{\theta}}_{\text{net private benefit of control}} - \underbrace{\left[\frac{1-p}{p-q}\left(\frac{e^H - e^L}{\theta} + c^H - c^L\right) - \left(p - c^H - \bar{U}\right)\right]}_{\text{endogenous cost of control}}. \tag{7}$$

The existing literature (for example, Bolton and Von Thadden 1998 and Maug 1998) has pointed out that being a controlling shareholder may incur private cost due to, for example, monitoring firm management and restructuring; these costs are captured in the first term of Δ^H above. The second term,

[33] For ease of exposition, in the previous section, we focused on equilibria in which controlling shares are traded only following a bad outcome and noncontrolling shares are never traded. One can easily construct payoff-equivalent equilibria in which both the controlling and noncontrolling shares are traded following a good outcome.

the endogenous cost of control, measures the difference between the punishment suffered by a controlling share (i.e., $(1-p)\left[\left(e^H-e^L\right)/\theta+c^H-c^L\right]/(p-q)$) and a noncontrolling share (i.e., $p-c^H-\bar{U}$). In an equilibrium with high-quality production, it is necessary that the controlling shareholder experiences a more severe punishment following a product failure in order to overcome her moral hazard problem. The existence of this endogenous cost of control implies that even if the net private benefit of control is positive, the control premium could still be negative.

Corollary 1 *Suppose $\delta > \hat{\delta}(\theta)$. There exists a $B^* > e^H$ such that the control premium following a good outcome is negative, i.e., $\Delta^H < 0$ if and only if $B \in [e^H, B^*)$.*

Negative control premiums have been identified empirically. Holthausen, Leftwich and Mayers (1987) found that in large seller-initiated block transactions, buyers received price concessions. Barclay and Holderness (1989) found that 20 percent of their sample block trades were priced at a discount. Dyck and Zingales (2004) and Albuquerque and Schroth (2010) report that 41 percent and 50 percent of block transactions were traded at a discount in their respective samples. In their sample of block trades in China, Dong, Uchida and Hou (2014) found that on average, a block was traded at a discount of 50 percent relative to the firm's book value.

Relatedly, Lease, McConnell and Mikkelson (1983), Pinegar and Ravichandran (2003), and Valero, Gomez and Reyes (2008) showed that some companies' shares with superior voting rights were traded at a discount compared to shares with inferior voting rights. Some informal arguments for the observed negative control premiums are that shares with inferior control rights are more liquid and that the controlling shareholder may have to bear legal liabilities (Dyck and Zingales 2004). Nevertheless, the empirical observation of negative control premiums is considered by some to be puzzling because there is no formal theory that rationalizes it.[34]

4.2.2 Dynamics of control premium

As the endogenous cost of control is due to the punishment targeted at the controlling shareholder, which takes place following the firm's lapse in product quality, the control premium is lower and more likely to be negative in periods immediately after the firm has produced low-quality products. Specifically, following a bad outcome, the control premium can be expressed as follows. First, the value of a controlling share is simply its price T in the controlling-block transaction. Moreover, the value of a noncontrolling share, denoted by $\underline{U}$, is weakly below its normal value $\bar{U}$, due to the imminent punishment in the product

[34] Lease, McConnell and Mikkelson (1983), Kruse, Kyono and Suzuki (2006) and Valero, Gomez and Reyes (2008) explicitly describe the observation of negative control premiums as a puzzle.

market. More precisely, denote by $D(\beta,\theta)$ the discount on the product price in the period immediately after the controlling-block transaction.[35] The value of a noncontrolling share $\underline{U}$ following a bad outcome is below its normal value $\bar{U}$ as

$$p - c^H - (1-\delta p) D(\beta,\theta) = \underline{U} < \bar{U} = p - c^H - \delta(1-p) D(\beta,\theta). \quad (8)$$

The firm's control premium during bad times is therefore $\Delta^L \equiv T - \underline{U}$. While the value of noncontrolling shares suffers after a bad product outcome, the magnitude is smaller than that suffered by the controlling shares. In particular, if $\delta \geq \tilde{\delta}(\beta,\theta)$, the noncontrolling shareholders are spared the equilibrium punishment altogether.

Corollary 2 *If $\delta > \hat{\delta}(\theta)$, then the control premium following a bad outcome is lower than that following a good outcome, i.e., $\Delta^H > \Delta^L$.*

This prediction is consistent with the empirical findings. Barclay and Holderness (1989, 1991) find that the average control premium is lower if the target firm has poor performance prior to the block trade. Dyck and Zingales (2004) find that the control premium is significantly lower for selling firms in financial distress. Relatedly, Kruse, Kyono and Suzuki (2006) compare shares with different voting rights, and find that the private benefits of control are the most negative when the target firm is financially distressed.

4.2.3 Relation between the control premium and the firm's post-acquisition performance improvement

Control premiums involved in mergers and acquisitions are often sizeable, so the stakeholders involved are naturally interested to know whether a higher premium paid for the controlling block is associated with a better post-acquisition performance. In this subsection, we explain our model's implications for this relationship, discuss related empirical findings, and contrast our results with the existing literature.

Recall in the equilibrium we characterize in the previous section, the gain from trading the controlling block between the incoming and the incumbent controlling shareholder, which is due to customers' differential treatments towards them, arises only after a low product quality realization. Consequently, transactions following bad outcomes are marked by low control premiums (recall Corollary 2), as well as an improvement in firm performance after the turnover. On the other hand, transactions following good outcomes are marked by higher control premiums, as well as no post-turnover improvement in firm performance. By comparing these two types of turnover, we have the following corollary.

[35] The exact formula for the discount can be found in the proof of Proposition 2.

Corollary 3 *Suppose* $\delta > \hat{\delta}(\theta)$*. A lower control premium in negotiated block trades is associated with a more significant improvement in the firm's post-turnover performance.*

While conventional management theories that suggest a positive relationship between the price premium paid and the firm's post-turnover performance,[36] a number of empirical studies found a negative relationship. Using different performance measures, Sirower (1997), Hayward and Hambrick (1997), and Krishnan, Hitt and Park (2007) find a negative relationship between the acquisition premium and the change in the target firm's post-acquisition performance.[37] One descriptive argument used by these authors is that a high premium is an indication of bad managerial decision or managerial hubris. Our explanation is different; in our model all managers have the same managerial ability, and they are all rational. The negative relationship is a necessary part of the equilibrium to ensure that the incumbent controlling shareholder is sufficiently penalized for bad outcomes, and is willing to exit the firm voluntarily.

An immediate implication of Corollary 3 is that the announcement of block trades at a discount is good news for the target firm's noncontrolling shareholders. Barclay and Holderness (1989) show that the target firms' cumulative stock returns are higher following block trades conducted at discounts than following those conducted at premiums. Albuquerque and Schroth (2010) report that when the block is traded at a discount, it generates a positive equity price impact more often than those cases of block premium.[38] Similar findings have been reported in Trojanowski (2008) and Byrka-Kita, Czerwiński and Preś-Perepeczo (2018).

The relation between the control premium in takeover and the firm's post-acquisition performance has also been investigated in Burkart, Gromb and Panunzi (1998). They consider a setting in which the controlling shareholder can extract private benefits of control after the acquisition, and find that a higher takeover premium (possibly arising from fierce competition in the takeover market) helps to protect minority shareholders. The reason is that a higher takeover premium is associated with a more concentrated post-takeover ownership, which in turn induces less extraction of the private benefit by the controlling shareholder, thus improving the values of noncontrolling shares. Our model considers a

[36] Intuitively, a manager who is more capable or has identified a higher value in the target company is willing to pay a higher premium, and the company is also expected to perform better under the new management.

[37] Sirower (1997) uses postacquisition periods, ranging from three days to four years, and find a consistently significant negative association between premium size and subsequent returns. Hayward and Hambrick (1997) find that the acquisition premiums have a significant negative impact on the acquired firm's one-year abnormal stock return. Krishnan, Hitt and Park (2007) show a negative relationship between acquisition premiums and the firm's two-year average return on sales after the acquisition, after controlling for the firm's prior performance.

[38] See, respectively, Section 3.3 of Barclay and Holderness (1989) and Section 4.2 of Albuquerque and Schroth (2010).

different dimension of the conflict of interest between the controlling and noncontrolling shareholders: the controlling shareholder bears the full effort cost in maintaining high-quality production, whereas she is entitled to only part of the security benefits associated with strong customer trust. Interestingly, by varying the bargaining power allocation in the block-trade negotiations, we arrive at a conclusion opposite to that of Burkart, Gromb and Panunzi (1998).

To see this, let us hold fixed other parameters and study how a change in the bargaining power of the incumbent, β, affects the price of the controlling block and the firm's profit immediately after the acquisition. Recall that in the optimal equilibrium constructed above, following a bad outcome, the controlling block is sold to a new entrepreneur through Nash bargaining, and the noncontrolling share values drop to $\underline{U}$ because of a product discount $D(\beta, \theta)$ offered to customers. If $\delta \in (\hat{\delta}(\theta), \tilde{\delta}(\beta, \theta))$, product-market punishment is necessary in supplementing the punishment by the corporate-control market to provide sufficient incentives for high-quality production. The higher the bargaining power β of the incumbent, the less effective the punishment by the corporate-control market is, resulting in a higher control premium in the controlling-block transaction. At the same time, a larger discount $D(\beta, \theta)$ is needed to sustain incentives for high-quality production, resulting in a lower post-acquisition profit.

Corollary 4 *An increase in the bargaining power of the incumbent controlling shareholder β has the following effect on the optimal equilibrium:*

(i) The control premium weakly increases.

(ii) The firm's profit in the period after the turnover of the controlling block weakly decreases.

Moreover, if $\delta > \hat{\delta}(\theta)$, the above relations are strict when β is sufficiently large.

In contrast to Burkart, Gromb and Panunzi (1998), Corollary 4 predicts that a high control premium paid in the controlling block transaction (due to a stronger bargaining position of the incumbent controlling shareholder) can harm the firm's post-acquisition profit and hence the security benefit received by the noncontrolling shareholders. Empirical studies discussed above provide some support for our prediction.

4.2.4 Relation between the control premium and block size

Both the theoretical and empirical literature in negotiated block trades have investigated the relation between block size and its premium. By considering the controlling shareholder's moral hazard problem in engaging in high-quality production, our model can shed new light on this relation. As we assume the net private benefit of control $B - e^H$ is independent of block size in our model, a direct effect of increasing block size θ is diluting the net private benefit of control per unit controlling share. To concentrate on the implication arising from incentivizing high-quality production, we consider the scenario that the net private benefit of control is negligible.

If the size of the controlling block θ is larger, then changes in share value have a larger impact on the controlling shareholder's payoff. Therefore, a smaller reduction in (per-unit) share value following a bad outcome can provide sufficient incentives for high-quality production. This in turn implies that a higher per-unit transaction price T of the controlling block would still be incentive compatible. Consequently, if $\delta \geq \tilde{\delta}(\beta, \theta)$ so that the value of noncontrolling shares $\bar{U} = p - c^H$ is independent of θ, the control premium in the block trade is increasing in θ. Note that for a fixed pair of discount factor δ and incumbent's bargaining power β, inequality $\delta \geq \tilde{\delta}(\beta, \theta)$ holds if and only if θ is sufficiently large.

On the other hand, if $\delta \leq \tilde{\delta}(\beta, \theta)$, or equivalently, θ is sufficiently small, the value of noncontrolling shares varies with θ. Specifically, in this case, a larger controlling block implies a smaller post-acquisition product price discount is needed to sustain the incentives for high-quality production, so $\underline{U}$ goes up. Recall that the block price is determined by Nash bargaining between the incumbent and the new controlling shareholder, and the surplus of the bargaining is determined by the difference in the magnitude of the product market punishment that they experience. If the product market punishment under the new controlling shareholder becomes weaker because of an increase in θ, then the surplus of the bargaining grows, as manifested by an increase in $\underline{U}$. A fraction of this increase in surplus goes to the incumbent in the form of a higher block price T. Consequently, the increase in T is smaller than that of $\underline{U}$, so the control premium $T - \underline{U}$ goes down with a larger block size. The following corollary summarizes the discussion above.

Corollary 5 *Suppose $B = e^H$. The control premium $T - \underline{U}$ in block trades exhibits a U-shaped relation in θ.*

By focusing on the moral hazard problem in product quality, our model predicts that for large blocks, its premium is positively correlated with block size. This prediction is in sharp contrast to Burkart, Gromb and Panunzi (2000), which focus on the controlling shareholder's moral hazard problem in extracting private benefits of control and find that the relation between block size and its premium is always negative, regardless of block size. Corollary 5 is broadly consistent with the finding of Barclay and Holderness (1989) that blocks of size exceeding 25 percent of total equity exhibited a significantly positive relation between block size and its premium; while the relation is slightly negative (though insignificant) for blocks of size less than 25 percent.[39]

[39] The hypothesis that the control premium in block trades may not vary monotonically with block size is not explicitly

4.2.5 Relation between the control premium and bargaining powers

In our model, block trades are assumed to take place through Nash bargaining between the incumbent and the incoming controlling shareholders, so it is natural that the control premium in the block trade is dependent on their bargaining powers. As shown by part (i) of Corollary 4, the control premium in the block trade is weakly increasing in the incumbent's bargaining power β (and strictly so for β sufficiently large). The empirical literature has considered different approaches to estimate bargaining powers in block transactions. For example, Dyck and Zingales (2004) argue that companies acquired by foreigners are likely to face more intense competition, thus conveying stronger bargaining power to the incumbent. They find that foreign buyers indeed pay a significantly higher premium. In the model of Albuquerque and Schroth (2010), the incumbent's bargaining power is increasing in its ability in opposing the acquirer's tender offer, and the control premium (discount) is found to be more likely to occur when the incumbent is effective (ineffective) in opposing a tender offer.

4.3 Case Studies

Let us conclude this section with some real-world cases of control-block transactions that are consistent with our theory. The recent acquisition of Mitsubishi Motors by Nissan matches a number of features of our model's implications. Mitsubishi Motors experienced a scandal in April 2016, in which it admitted to have been manipulating fuel economy data of four minicar models and improperly testing other Japanese models since 1991. Its share price fell by half after the scandal broke out. In May 2016, Nissan acquired a 34 percent stake of Mitsubishi and became its single largest shareholder. Instead of paying an acquisition premium, Nissan purchased the shares at a 5.3 percent discount. After the acquisition, Nissan's CEO became Mitsubishi's chairman, and three executives joined Mitsubishi's board of directors.[40] The announcement of the acquisition triggered a significant positive response in Mitsubishi's share value as well as profit recovery.[41] Similar to Mitsubishi, Volkswagen experienced a diesel emissions scandal in September 2015, when the United States Environmental Protection Agency announced its finding that Volkswagen had intentionally programmed their turbocharged direct injection diesel engines to artificially reduce their emissions only during laboratory emissions testing to meet the U.S. standards. During year

tested in the literature. However, evidence exists suggesting that the control premium is not monotonically decreasing in block size. For example, Dyck and Zingales (2004) find that the control premium is higher for blocks exceeding 50% of total stake than those below 50%. Albuquerque and Schroth (2010) find that the relation between the control premium and block size is positive, but insignificant.

[40] Tajitsu, Naomi and Maki Shiraki, "Nissan takes controlling stake in Mitsubishi, pledges support for turnaround," Reuters Business News, 20 October, 2016.

[41] Hoshi, Masamichi, "No victory lap for "low key" Mitsubishi Motors after profit recovery," Nikkei Asian Review, 8 November 2017.

2015, Volkswagen's stock price fell from 253.2 EUR to 92.36 EUR at some point. There has not been any ownership change in Volkswagen since the scandal occurred. If we use either S&P 500 or DAX as a proxy of the market trend, then Volkswagen has not shown any sign of recovery relative to the market trend. Our theory predicts that an ownership change could have led Volkswagen's stock price to recover.

In another case of ownership turnover, Fujiya, a large nationwide cake store and restaurant chain in Japan, admitted in 2007 that stale and outdated ingredients had been used in some of its products for the past seven years. Its stock price plummeted after the outbreak of the food-safety scandal. From 2007 to 2008, another bakery company, Yamazaki Baking, acquired a controlling stake in Fujiya, at a discount of 18 percent. Extensive turnover in the board of directors took place during the ownership change.[42] After the acquisition concluded, the stock price of Fujiya has steadily recovered. Admittedly, there are other factors contributing to these and other similar takeover cases, as well as alternative explanations for the apparent turnaround of the acquired firms in these cases. However, our theory, which sheds new light on the understanding of control transactions, provides a plausible explanation complementary to others.

5 Optimal Ownership Structure

In this section, buidling upon the equilibrium computation in Section 3, we endogenize the firm's ownership structure by finding the optimal value of θ from the company founder's perspective. The total payoff of the founder consists of two components, the value of the shares that she retains as the controlling block, and the proceeds from the sales to the noncontrolling shareholders. We assume that there is perfect competition for noncontrolling shares among investors, which allows the company founder to fully capture the value of the noncontrolling shares. Therefore, the total payoff of the founder coincides with total shareholder value, as in equation (2). Note that total shareholder value of the company is necessarily less than the sum of the net private benefit of control and the company's profit, because part of the value of the company is captured through Nash bargaining by future controlling shareholders who take over the company's control.

Recall that in the benchmark analysis in Section 3.1, we assume that the transfer of the controlling block is infeasible. The total shareholder value (stated in Proposition 1) is increasing in θ, thus implying that the optimal ownership structure is to set $\theta = 1$, i.e., the firm is fully owned by the controlling

[42] Kageyama, Yuri,"Confectioner Company Scandal Rocks Japan," CBS News, 16, January, 2007. See also Kanoko Matsuyama, "Yamazaki to Pay 16 Billion Yen to Take 35% of Fujiya," Bloomberg, 26 March, 2007.

shareholder. In contrast, as we will demonstrate below, the determination of the optimal ownership structure is more subtle when the transfer of the controlling block is feasible.

Recall also that in Proposition 2, we established that the share values in the optimal equilibrium depends not only on the size of the controlling block, but also on the discount factor and the bargaining power distribution. Using Figure 2, we can define the following cutoffs. For each $\delta \geq \hat{\delta}(1)$, define $\underline{\theta}(\delta)$ as the solution to the equation $\delta = \hat{\delta}(\theta)$. Also define $\bar{\theta}(\delta, \beta)$ as the solution to the equation $\delta = \tilde{\delta}(\beta, \theta)$ if $\delta > \tilde{\delta}(\beta, 1)$; otherwise, set $\bar{\theta}(\delta, \beta) = 1$. It is clear that both functions above are well-defined, as $\hat{\delta}$ and $\tilde{\delta}$ are strictly decreasing in δ. It is also easy to verify that for $\delta \in \left(\hat{\delta}(1), 1\right)$, $\underline{\underline{\theta}} < \underline{\theta}(\delta) < \bar{\theta}(\delta, \beta)$ (see Figure 3 below).

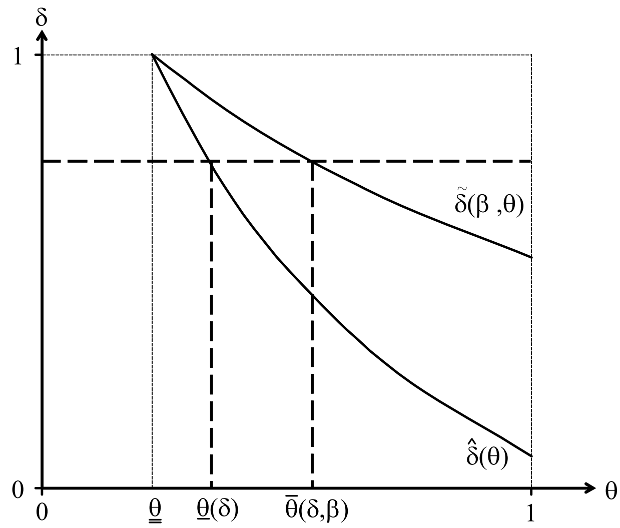

Figure 3: Cutoff values for optimal ownership structure

In determining the optimal ownership structure, there is a basic tradeoff between managing the controlling shareholder's moral hazard problem and mitigating the endogenous cost of corporate control. To see this, let's begin by expressing the total shareholder value as

$$S = U - \left(-\theta \Delta^H\right).$$

The first term U is the value of noncontrolling shares, and is given by the expected present value of the firm's profit stream. The second term $-\theta \Delta^H$ represents the total cost of corporate control; it is the amount by which the value of the controlling block falls below that of a noncontrolling block of the same size. Below, we discuss how converting some controlling shares into noncontrolling shares (i.e., lowering the size of the controlling block θ) affects these two terms. As setting $\theta < \underline{\theta}(\delta)$ makes high-quality production unsustainable in equilibrium and is clearly suboptimal, our discussion below focuses on the cases of $\theta \in (\bar{\theta}(\delta, \beta), 1]$ and $\theta \in (\underline{\theta}(\delta), \bar{\theta}(\delta, \beta)]$. For expositional simplicity, suppose $B = e^H$, so that the net private benefit of control is zero, and Δ^H simply represents the difference in the magnitude of punishment suffered by a controlling share and that by a noncontrolling share (recall (7)). As explained in Section 4, $\Delta^H < 0$ in this case, so the total cost of corporate control is $\theta \left|\Delta^H\right|$.

Suppose first that $\theta \in (\bar{\theta}(\delta, \beta), 1]$. In this case, the firm does not have to offer any price discount following a turnover of the controlling block, so the noncontrolling shares achieve the maximum value $U = p - c^H$ (recall part (iv) of Proposition 2). Consequently, a reduction in θ does not affect U. On the other hand, a smaller size of the controlling block means that the controlling shareholder's payoff is less sensitive to changes in the per-share block discount in a control transaction. In order to provide sufficient incentives to the controlling shareholder to exert high effort and to incur high monetary production cost, the per-share punishment for a bad outcome must increase, so $\left|\Delta^H\right|$ becomes larger. However, the latter effect is partially mitigated by the fact that a reduction in θ also lowers the controlling shareholder's share of the monetary production cost. As a result, the total cost of the corporate control $\theta \left|\Delta^H\right|$ decreases as θ goes down.

Suppose next that $\theta \in (\underline{\theta}(\delta), \bar{\theta}(\delta, \beta)]$. This corresponds to case (iii) of Proposition 2, in which the firm has to suffer some punishment after the controlling-block turnover. On one hand, a reduction in θ implies that a stronger per-share punishment on the controlling shareholder is necessary to sustain incentives for high-quality production. In this case, the extra punishment calls for more destruction of the firm's profit, resulting in a lower value of U. On the other hand, a decrease in θ lowers the total cost of corporate control, and the reason is as follows. Because of the Nash bargaining between the incoming and the incumbent controlling shareholders, only a fraction β of the destruction of the firm's post-acquisition profit is translated into punishment of the incumbent controlling shareholder. When a stronger (per-share) punishment on the controlling shareholder is called for following a decrease in θ, the post-acquisition profit must go down by more than the necessary increase in punishment. Therefore, U goes down by more than V. As a result, as θ gets smaller, $\left|\Delta^H\right|$ also goes down, so the total cost of corporate control $\theta \left|\Delta^H\right|$ decreases. In sum, converting controlling shares into noncontrolling shares mitigates the total cost of corporate control, at the expense of a lower firm profit.

This discussion above implies that the optimal size of the controlling block lies between $\underline{\theta}(\delta)$ and $\bar{\theta}(\delta, \beta)$. The exact optimal value is determined by a number factors such as the severity of the moral hazard problem and the discount factor. A more severe moral hazard problem, caused by an increase in

$e^H - e^L$ or $c^H - c^L$, necessitates a larger equilibrium punishment on the controlling shareholder following a quality lapse. An effective control over the more severe moral hazard problem thus calls for a larger size of the controlling block. Moreover, as discussed above, the Nash bargaining in the transfer of the controlling block implies that the impact of a larger equilibrium punishment on a noncontrolling share is greater than that on a controlling share. Consequently, an increase in the severity of moral hazard lowers the per-share cost of control (i.e., $|\Delta^H|$ becomes smaller), making a large controlling block less costly. These considerations explain why it is optimal to have a larger controlling block when the moral hazard problem is more severe. Furthermore, a larger magnitude of punishment is needed for a less patient controlling shareholder, as punishment is delayed while effort and monetary cost saving is immediate. Consequently, the optimal size of the controlling block becomes larger if the discount factor decreases. Proposition 3 formalizes the discussion above.

Proposition 3 *Let θ^* be the optimal size of the controlling block that maximizes the total shareholder value in the optimal equilibrium with controlling-block turnover. If $\delta \in [\hat{\delta}(1), 1)$, then*

(i) θ^* is unique and is in the interval $[\underline{\theta}(\delta), \bar{\theta}(\delta, \beta)]$. Moreover, $\theta^* \to \underline{\underline{\theta}}$ as $\delta \to 1$.

(ii) θ^* is weakly increasing in $e^H - e^L$ and $c^H - c^L$; and is weakly decreasing in δ. Furthermore, the relations above are strict if $\theta^* \in \left(\underline{\theta}(\delta), \bar{\theta}(\delta, \beta)\right)$.

If $e^H - e^L$ and/or $c^H - c^L$ are sufficiently small, the controlling shareholder's moral hazard problem is mild. In this case, the punishment by the corporate-control market alone can be strong enough to provide incentives to sustain high-quality production, so $\bar{\theta}(\delta, \beta)$ is low.[43] As shown in the corollary below, in the extreme case where $c^H - c^L = 0$, the optimal size of the controlling block θ^* is $\bar{\theta}(\delta, \beta)$. Similarly, if $e^H - e^L = 0$, $\theta^* = \bar{\theta}(\delta, \beta) = 0$. On the other hand, in some intermediate range of effort and monetary costs, θ^* takes a value in the interval $\left(\underline{\theta}(\delta), \bar{\theta}(\delta, \beta)\right)$, and punishment from the product market is necessarily invoked in equilibrium.

Corollary 6 *Suppose $\delta \in [\hat{\delta}(1), 1)$.*

(i) If $c^H - c^L = 0$ or $e^H - e^L = 0$, then $\theta^* = \bar{\theta}(\delta, \beta)$.

(ii) There exists a set of effort and monetary costs $\left(\underline{E}, \bar{E}\right) \times \left(\underline{C}, \bar{C}\right)$ such that $\theta^* \in \left(\underline{\theta}(\delta), \bar{\theta}(\delta, \beta)\right)$ if $\left(e^H - e^L, c^H - c^L\right) \in \left(\underline{E}, \bar{E}\right) \times \left(\underline{C}, \bar{C}\right)$.

The analysis in this section is related to Zingales (1995), who derives the practice of selling cash-flow rights to dispersed shareholders and selling control rights through direct bargaining as the outcome of maximization of total proceeds from the sale of a company. Our model has a similar feature that dispersed

[43] Note that if $\delta < \tilde{\delta}(\beta, 1)$, punishment by the product market is still a necessary part of the equilibrium.

shareholders are perfectly competitive and the acquirer of control rights has substantial bargaining power. Other than that, our analysis is different in several important ways. In Zingales's model, the incumbent owner goes public if and only if the incoming controlling shareholder generates a higher profit for the firm. Furthermore, the sale of cash-flow rights is partial only if the incumbent derives a higher level of private benefit than the new owner. On the contrary, in our model, the company founder goes public and chooses to sell cash-flow rights partially even if every potential controlling shareholder generates the same level of profit for the firm and derives the same level of private benefit. Our results emerge from the consideration of the controlling shareholder's moral hazard problem and the mitigation of the impact of product market punishment on firm value, while these factors are absent in Zingales's analysis.

6 Discussion

For tractability, we have abstracted away from many issues in our analysis. We discuss some of them below.

Alternative Applications The main message of our analysis is that in repeated interaction in which punishment on players following some bad observable outcomes is necessary to sustain proper incentives, turnover of the player(s) responsible for the bad outcome can help mitigate the negative externality of punishment, thus improving overall efficiency. We deliver this message using a monopoly experience-goods firm run by a controlling shareholder, and illustrate that the controlling-block transactions can help preserve the overall shareholder value of the firm. As pointed out in the introduction and the literature review, implicit or relational contracts are often in place in the firm's relationships, not only with its customers, but also with its employees, suppliers, and capital providers. Efficient management of these relationships is thus important for both the firm and its stakeholders, and our theory is applicable to these relationships.

For instance, suppose the firm relies on the capital provided by some lenders at an interest rate P. The controlling shareholder is responsible for monitoring the firm's financial accounts, which requires costly personal effort (i.e., $e_t = e^H$) as well as monetary cost (i.e., $c = c^H$) to achieve a high likelihood of accurate reporting and timely repayment (analogous to engaging in high-quality production, i.e., a high probability p of realizing a good outcome $y_t = 1$). Financial misrepresentations or accounting scandals correspond to a failure in monitoring (analogous to the realization of a bad outcome $y_t = 0$), and they harm the lenders' interests and confidence in the firm's management. One possible trust mechanism that regulate the controlling shareholder's moral hazard problem in monitoring is to associate the revelation of scandals to penalties from the capital market in the form of a higher interest rate $P' > P$ (Graham, Li and Qiu (2008) and Deng, Willis and Xu (2014)). This hurts the firm's profit by raising the cost of capital and in turn the controlling shareholder's payoff. Applying to the setting outlined above, our theory suggests that turnover of the controlling block can facilitate the recovery of trust of the lenders in the capital market, as the incoming controlling shareholder is not responsible for the firm's failure prior to the takeover.

Alternatively, suppose the firm relies on the joint effort of the controlling shareholder (in selecting projects) and its employees (in implementing projects). To overcome the moral hazard problem of the controlling shareholder, she has to be punished when the firm has experienced failure by, for example, having the employees shirking for a number of periods. This punishment phase involves joint shirking and can be interpreted as a loss in workplace morale, as the employees do not believe that the controlling shareholder exerts effort herself.[44] Applying to this setting, our theory suggests that the controlling shareholder can speed up the process of turnaround in workplace morale and hence firm productivity by ceding control to a new entrepreneur.

Observable Block Price In our model, the transaction price of the controlling block is assumed to be unobservable to customers. The role of this assumption is to ensure that customers do not form beliefs about the firm's future product quality based on the block price. All of our results would remain intact as long as customers' belief about future product qualities depends only on the identity of the controlling shareholder, but not on the price at which the controlling block is traded. In practice, the price of a controlling-block transaction is determined by a multitude of factors, such as the target firm's operating costs, cash flow, and market conditions. Therefore, to a typical customer that does not possess sufficient knowledge in finance and accounting, the block price is a noisy indicator of the punishment suffered by the incumbent controlling shareholder. As it is difficult (if not impossible) for customers to infer from the block price whether the incumbent is punished sufficiently for the bad outcome, a punishment mechanism based on customers' monitoring through the block price is implausible.

In an alternative setting in which the block price is observable, and customers can judge the magnitude of punishment on the controlling shareholder and form beliefs about future product quality based on the block price, there exist equilibria in which the firm is forgiven for its bad outcome if and only if the controlling block is traded at a sufficiently low price. We can still model the negotiation stage as Nash bargaining, except that the surplus of the negotiation will materialize if and only if the block price is

[44] See for example, Levin (2002) and Li and Matouschek (2013).

below a certain threshold.[45] Our main message that the turnover of a controlling block can help recover customer trust and preserve firm value remains valid.

Identity of Incoming Controlling Shareholder In our model, the incoming controlling shareholder is a completely independent player from the incumbent controlling shareholder. This independence ensures that the gain from trading the controlling block received by the incoming controlling shareholder does not leak to the incumbent. It is explicit in our equilibrium construction that the incumbent controlling shareholder must receive a sufficiently small fraction of the surplus of the negotiated block trade to ensure that sufficient punishment is imposed. Consequently, if the incumbent and the incoming controlling shareholders have vested interests (for instance, sharing a common owner or substantial cross shareholdings), then the sale of the controlling block may not constitute a sufficient punishment on the incumbent. As customers are rational, if the control transaction appears suspicious and unconvincing (that an actual change in control rights occurs), it is natural that they would not forgive the firm for the bad outcome, and the gain from trading the controlling block vanishes. Therefore, to recover customers' trust in the firm effectively, the control transaction must be convincing, and it is in the interests of both controlling shareholders to disclose hard information to convince the customers that the control transaction is real.[46]

In a similar vein, for our equilibrium punishment mechanism to work, it is necessary that the controlling shareholder cannot easily get around or mitigate the punishment involved in selling the controlling block. We discuss some conceivable attempts to game the mechanism below. First, the incumbent controlling shareholder may attempt to seek a buyer with weak bargaining power. However, in a competitive market for corporate control, the incumbent faces competition with other investment opportunities, so it is often necessary to cede sufficient surplus to the buyer. Second, the incumbent may try to collect hidden kickbacks from the acquirer following the controlling-block transaction. However, under-the-table transfers will violate the block-trade reporting requirements imposed by security-trading regulations.[47] Finally, prior to the controlling-block transaction, the incumbent may be tempted to buy shares of the acquiring company, as they are expected to increase in value. However, making profits with non-public

[45] The optimal equilibrium of such a setting would involve the controlling block changing hands at the maximum price that is sufficient for incentivizing high-quality production, and no product price discount is needed after the takeover.

[46] Our model can be extended to explicitly take into account the possibility that there are multiple potential acquirers and only some of them are credibly independent. In this case, there exists equilibria in which customers forgive the firm only if the incumbent controlling shareholder sells his/her block to a credible acquirer. Suppose further that it takes several periods before a credible acquirer emerges, then there exist equilibria in which the firm is punished until such a buyer arrives and the control of the firm changes hands.

[47] See for instance, https://www.sec.gov/rules/final/2015/34-74244.pdf.

information is likely to violate regulations governing insider trading.

Alternative Turnaround Mechanisms We have focused on the effect of negotiated block trades on recovering customers' trust and firm profit. We have done so not because this is the only possible way to preserve firm value from product market punishment. Rather, our focus is partially motivated by the fact that turnover of ownership and control is common, and by empirical findings that ownership and management turnover are integral parts of a successful turnaround. In fact, if we allow the controlling shareholder to credibly burn money (for example, by making payments to a third party), then there exist equilibria in which customers forgive the firm's bad outcome if and only if the controlling shareholder has burnt a large enough amount of money. Requiring the controlling shareholder to burn money following every bad outcome may, however, cause her to eventually run into her liquidity constraints because bad outcomes are associated with low (and possibly negative) profits.[48] By contrast, under the turnover mechanism proposed here, the controlling shareholder receives a payment for selling the controlling shares so she will not run into her liquidity constraint.

Similarly, penalizing the controlling shareholder by requiring her to make transfers to noncontrolling shareholders following every bad outcome may be infeasible because of her liquidity constraint. Moreover, such a punishment scheme is easily subject to manipulation by the controlling shareholder. For example, she may tunnel resources from the firm to finance her payments to noncontrolling shareholders, who as beneficiaries, would not object to such practice. In fact, if such mechanism was feasible and adopted, a firm's share price would increase following bad outcomes, such as product failure or quality scandals, anticipating that payments would soon be received from the controlling shareholder. This is, however, rejected by empirical observation, as firms suffering from scandals experience a significant drop in share price and become likely takeover targets.[49]

Equilibrium Selection We have focused our analyses on the equilibria that yield the highest shareholder value. Below, we explain why the effectiveness of the turnover mechanism is robust to alternative equilibrium selections. Recall the benchmark setting in Section 3.1 that the controlling block never changes hands, and take a stationary PPE in which high-quality production is sustained on the equilibrium path, and the value of the controlling share W following a bad outcome exceeds the lowest equilibrium value $\frac{B-e^L}{\theta}+q-c^L$.[50] Note that we require neither the product price being set at the highest

[48] Even if a few bad outcomes may not cause any trouble, a sufficiently long streak of bad outcomes, which always happens with a positive probability, will cause the controlling shareholder's liquidity constraints to fail and the equilibrium to unravel.

[49] Recall the empirical evidence discussed in Section 4.

[50] The stationarity assumption is not needed for the subsequent argument, but it simplifies our notation without having to index the time and history of continuation payoffs.

level of p in the normal phase, nor W equal to the highest level that is incentive-compatible with high-quality production. Now, if we allow the controlling block to be traded, as in the full model studied in Section 3.2, we can modify the PPE above by having the controlling block changing hands following bad outcomes and achieving a higher firm value. To this end, set the price of the negotiated block trade at W, and the off-path punishment phase payoff at $\frac{B-e^L}{\theta}+q-c^L$, while keeping customers' behaviors (and hence the value V of the controlling shares) unchanged. By Nash bargaining, the incoming controlling shareholder receives a per-share payoff of $\hat{W}$ that exceeds W, implying that less firm profit needs to be destroyed after the turnover for customers' trust to be restored. The effectiveness of the ownership-turnover mechanism thus hinges only on the customers' favorable treatment to the incoming controlling shareholder, which we believe is a reasonable response, as the incoming controlling shareholder is not responsible for the firm's lapse in product quality prior to the turnover. It follows that the empirical implications of our model remain qualitatively valid even if we do not restrict attention to the optimal PPE. Specifically, we can show that, within the class of equilibria with controlling-block turnover outlined above, Corollary 1 to 4 still hold. Moreover, while the determination of the optimal ownership structure clearly depends on the selection of the associated equilibria, the tradeoff of managing the controlling shareholder's moral hazard problem and mitigating the endogenous cost of corporate control remains relevant within the class of equilibria outlined above. The appendix contains a more detailed explanation for the argument above.

Competition Among Potential Acquirers We have ignored the issue of competition among potential acquirers by assuming that only one potential acquirer enters the game in every period. A simple way to capture the impact of competition is to assume that the bargaining power of the incumbent controlling shareholder increases with the intensity of the competition for the controlling block. In the extreme case where competition is so fierce that the incumbent has all of the bargaining power, i.e., $\beta = 1$, negotiated block trade fails to act as a disciplinary device. We take the view that it is unlikely that the incumbent has full bargaining power for the following reasons. First, oftentimes the incumbent owner has to face competition from owners of other companies trying to sell control rights in the market for corporate control, which limits their bargaining power. Second, even in the presence of multiple potential acquirers, there exist equilibria in which customers forgive the firm only if the controlling block is sold to some specific one(s).[51] In these equilibria, the incumbent's bargaining power is limited endogenously by the product market reaction. Moreover, even if multiple bidders emerge, the efficiency of an auction

[51] For instance, a credibly independent acquirer is more likely to convince customers that the transaction is real, the incumbent is punished, and the new controlling shareholder is not guilty of the firm's previous mishaps.

could be severely hampered by the transaction cost involved,[52] making it difficult for the incumbent to reap the full surplus of the transaction. As long as the incumbent controlling shareholder has less than full bargaining power, i.e., $\beta < 1$, allowing turnover of controlling shareholders can increase the firm profit and total shareholder value for a range of sufficiently high discount factors.[53]

7 Conclusion

This paper studies the corporate finance of firms whose sales and profit are sensitive to customer trust in the product market. It analyzes how the product market and the market for corporate control interact to provide the incentives for the firm's key decision makers to put in effort into maintaining high trustworthiness of the firm. We find that turnover in the controlling share block can help a firm repair trust in its customer relationship, even if all controlling shareholders have the same ability and their departure from the firm is voluntary. More importantly, such ownership turnover enhances the equilibrium profit and total shareholder value. The equilibrium property that the controlling shareholder must be punished for bad outcomes but the noncontrolling shareholders can be spared gives rise to an endogenous cost of corporate control. This cost of control gives rise to a number of novel implications about the control premium, which are boardly consistent with the empirical studies on negotiated block trades. Finally, we show that the firm's founder resolves the tradeoff between managing moral hazard and preserving firm value by partially selling cash-flow rights as noncontrolling shares.

There are several directions future research may pursue. First, as mentioned above, the benefit of ownership turnover applies to managing a firm's relation, not only with customers, but also its employees, suppliers and capital providers. These other relations, however, are likely to involve interesting features not present in experience-goods provision, and studying how they interact with ownership turnover could enrich our understanding of trust management. Second, while our analysis focuses on negotiated block trades, it is interesting to explore the implications of trust management on other modes of transferring ownership such as tender offers and proxy fights. Finally, while we assume symmetric information between the incumbent and incoming controlling shareholders, a number of theoretical studies have explored the implications of asymmetric information in corporate takeover. Incorporating information asymmetry could add not only realism but also additional insights on how information should be managed for the joint objective of trust maintenance and effective control transfer.

[52] For instance, the cost of investigation and bid formation can substantially lower the transaction price (see the survey by Hirshleifer (1995)).

[53] In the empirical studies of negotiated block trades by Dyck and Zingales (2004) and Albuquerque and Schroth (2010), the seller's bargaining power is estimated to be approximately 2/3.

Appendix

Proof of Proposition 1. First note that the controlling shareholder has the option of perpetually engaging in low-quality production and selling the product at $P_t = P = q$. When the controlling shareholder exercises this option, each noncontrolling share receives a flow payoff of $q - c^L$ and each controlling share receives $\left(B - e^L\right)/\theta + \left(q - c^L\right) > 0$. Also note that our assumption that each individual customer has zero measure and is anonymous implies that he/she is never willing to pay more than the expected value of the product. We thus have $P_t \leq p$.

It is standard that focusing on the following structure of equilibrium is without loss of generality in our search for the optimal equilibrium. There is a normal phase in which the firm engages in high-quality production and charges high prices. If the product outcome is favorable, the game stays in the normal phase; otherwise, it switches to the punishment phase in which the customers are willing to pay only a low price $P < p$, even though the firm continues to engage in high-quality production. A single good product outcome switches the game back to the normal phase, otherwise it stays in the punishment phase. The game begins in the normal phase. The value of a controlling share in the normal phase, V, is thus given by

$$\theta V = (1 - \delta)\left[B - e^H + \theta\left(P - c^H\right)\right] + \delta\left(p\theta V + (1 - p)\,\theta W\right).$$

Combining with incentive compatibility constraint (4) to eliminate V, we obtain

$$\frac{(1 - \delta)\left[B - e^H + \theta\left(P - c^H\right)\right] + \delta(1 - p)\,\theta W}{\theta(1 - \delta p)} \geq \frac{(1 - \delta)\left[B - e^L + \theta\left(P - c^L\right)\right] + \delta(1 - q)\,\theta W}{\theta(1 - \delta q)}. \quad (9)$$

One immediate observation is that since $1/(1 - \delta p) > 1/(1 - \delta q)$, for any given W, the incentive constraint is more easily satisfied with a higher P. Setting a higher P also raises both U and V. Therefore, in the optimal equilibrium, $P = p$.

Plugging $P = p$ into the incentive constraint (9) and rearranging gives:

$$W \leq \bar{W}(\delta, \theta) \equiv \frac{B - e^H}{\theta} + \left(p - c^H\right) - \frac{(1 - \delta p)\left(\frac{e^H - e^L}{\theta} + c^H - c^L\right)}{\delta(p - q)}. \quad (10)$$

The worst possible continuation equilibrium for the controlling shareholder has her engaging in perpetual low-quality production. A necessary condition for the sustainability of high-quality production is thus $\bar{W}(\delta, \theta) \geq \left(B - e^L\right)/\theta + \left(q - c^L\right)$, or equivalently,

$$\delta \geq \hat{\delta}(\theta) = \frac{e^H - e^L + \theta\left(c^H - c^L\right)}{q\left(e^H - e^L + \theta\left(c^H - c^L\right)\right) + \theta(p - q)^2}.$$

As long as $\delta \geq \hat{\delta}(\theta)$, there exists a value of $W \in \left[\left(B - e^L\right)/\theta + \left(q - c^L\right), \bar{W}(\delta, \theta)\right]$ such that high-quality production can be sustained in equilibrium. One immediate observation is that B does not affect the sustainability of high effort, as the controlling shareholder receives B regardless. Note that $\hat{\delta}(\theta)$ is decreasing in θ and $\hat{\delta}(0) = 1/q > 1$. If $\hat{\delta}(1) > 1$, then $\hat{\delta}(\theta) > 1$ for all θ and high effort is unsustainable for any discount factor. Therefore, for the analysis to be nontrivial, it is necessary that $\hat{\delta}(1) \leq 1$, which is equivalent to inequality (1). When inequality (1) holds, $\hat{\delta}(\theta) \leq 1$ if and only if $\theta \geq \underline{\underline{\theta}}$.

For $\delta \geq \hat{\delta}(\theta)$, the maximum value of a controlling share can be obtained by plugging $W = \bar{W}(\delta, \theta)$ from (10) into (4), and the maximum value of noncontrolling shares can be obtained using (3). Since W is enforced by a discounted price, setting $W = \bar{W}(\delta, \theta)$ means that the firm gives a price discount just large enough to support the incentive to engage in high-quality production. In other words, setting $W = \bar{W}(\delta, \theta)$ maximizes U and V, which in turn maximizes S. ■

Proof of Proposition 2. (i) If $\delta < \hat{\delta}(\theta)$, then $\bar{W}(\delta, \theta) < \left(B - e^L\right)/\theta + \left(q - c^L\right)$. To incentivize high-quality production, the transaction price of the controlling block cannot exceed $\theta \times \bar{W}(\delta, \theta)$. Such a low price cannot be sustained in any equilibrium because the incumbent controlling shareholder can secure a continuation payoff of $B - e^L + \theta\left(q - c^L\right)$ by perpetual low-quality production. Therefore, if $\delta < \hat{\delta}(\theta)$, only low effort can be supported in equilibrium even when turnover is allowed. Consequently, $\bar{V} = \frac{B - e^L}{\theta} + \bar{U}$ and $\bar{U} = q - c^L$.

(ii) In order to support high-quality production, the transaction price of the controlling block, and hence the continuation payoff to the controlling shareholder, cannot exceed $\theta\left(q - c^L\right) + B - e^L$ following a bad outcome. If the incumbent has positive bargaining power, this is possible only if the surplus from the trade of controlling block is zero, i.e. the newly arrived entrepreneur has to be punished as severely as the incumbent after taking over the firm. Thus, the firm's profit cannot be increased by turnover. Consequently, $\bar{U}$ and $\bar{V}$ stay at $\bar{U}_0$ and $\bar{V}_0$, respectively.

(iii) and (iv) It is clear that the upper bound for equilibrium values of noncontrolling shares in any PPE is $p - c^H$. Below, we explain why, even with controlling-block turnover is feasible, the upper bound for equilibrium values of controlling shares remain at $\bar{V}_0$.

To account for the value of a controlling share V, a shortcut is to imagine hypothetically that every time a bad outcome arises, the controlling shareholder, instead of realizing the loss of $\theta(V - T)$ by selling her block of shares, realized the loss of $\theta(V - T)$ but then continued to hold on to the controlling shares. With this interpretation, the value per controlling share can be expressed as

$$V = \frac{B - e^H}{\theta} + \left(p - c^H\right) - \delta(1 - p)\frac{V - T}{1 - \delta}.$$

The equation above can be rewritten as

$$V = \frac{1-\delta}{1-\delta p}\left[\frac{B-e^H}{\theta} + \left(p - c^H\right)\right] + \frac{\delta\left(1-p\right)}{1-\delta p}T. \tag{11}$$

Thus, the equilibrium value of V is increasing in the transaction price of the controlling block T, as long as $T \leq \bar{W}(\delta, \theta)$ so that the incentive for high-quality production is sustained. Therefore, the maximum possible value of V in any PPE with turnover of the controlling block and high-quality production is given by equation (11) with $T = \bar{W}(\delta, \theta)$. It then follows from straightforward algebra that the upper bound on the equilibrium value of V in any PPE is $\bar{V}_0$.

Below, we show that if the discount factor is large enough, the optimal equilibrium yields $\bar{U} = p - c^H$ and $\bar{V} = \bar{V}_0$. First, in order for the controlling share to achieve the value $\bar{V}_0$, we have to set $T = \bar{W}(\delta, \theta)$. Next, recall $\hat{W}$ is the per-share value of the controlling block to the new controlling shareholder following a turnover of the controlling block. Suppose high-quality production can be supported with $\hat{W} = \bar{V}_0$, so that no price cut is needed in the equilibrium punishment phase and the noncontrolling shares achieve the value $\bar{U} = p - c^H$ (recall equation (6)). Substituting $\hat{W} = \bar{V}_0$ and $T = \bar{W}(\delta, \theta)$ into equation (5) and rearranging it, we can express the value of controlling shares to the incumbent following an off-equilibrium negotiation breakdown, W, as

$$W = \frac{\bar{W}(\delta, \theta) - \beta \bar{V}_0}{1-\beta}.$$

Note that this off-the-equilibrium-path value of controlling share can be supported by requiring the incumbent to offer a price discount (equal to $\left(\bar{V}_0 - W\right)/(1-\delta) = \left(\bar{V}_0 - \bar{W}(\delta, \theta)\right)/[(1-\delta)(1-\beta)]$) to customers for one period. The equilibrium described above is feasible if and only if

$$W \geq \frac{B - e^L}{\theta} + \left(q - c^L\right). \tag{12}$$

This inequality translates into the following condition:

$$\delta \geq \tilde{\delta}(\beta, \theta) \equiv \frac{e^H - e^L + \theta\left(c^H - c^L\right)}{\left((1-q)\beta + q\right)\left(e^H - e^L + \theta\left(c^H - c^L\right)\right) + (1-\beta)\theta(p-q)^2}. \tag{13}$$

In sum, if $\delta \in [\tilde{\delta}(\beta, \theta), 1)$, $\bar{U} = p - c^H$ and $\bar{V} = \bar{V}_0$ in the optimal equilibrium. The equilibrium takes the form described in the text, with $T = \bar{W}(\delta, \theta)$. On the off-equilibrium path punishment phase in which the controlling shares are retained by the incumbent, a price cut $\left[\bar{V}_0 - \bar{W}(\delta, \theta)\right]/[(1-\delta)(1-\beta)]$ is offered to customers for one period. This concludes the proof for part (iv) of the proposition.

Next, suppose $\delta \in [\hat{\delta}(\theta), \delta(\beta, \theta))$. In the optimal equilibrium, $\bar{V} > \hat{W}$, and a price discount is offered in the on-the-equilibrium punishment phase. It is therefore immediate that $\bar{U} < p - c^H$. We now proceed to construct the optimal equilibrium.

Equation (5) can be written as

$$\hat{W} = \frac{T - (1-\beta) W}{\beta}. \tag{14}$$

Using (14) and (11), the price cut, denoted by $D(\beta,\delta)$, can be written as

$$D(\beta,\delta) \equiv \frac{V - \hat{W}}{1-\delta} = \frac{1}{1-\delta p}\left[\frac{B - e^H}{\theta} + \left(p - c^H\right)\right] - \frac{1}{1-\delta}\left[\frac{1}{\beta} - \frac{\delta(1-p)}{1-\delta p}\right] T + \frac{1-\beta}{\beta(1-\delta)} W. \tag{15}$$

Note that because $\delta \in [\hat{\delta}(\theta), \delta(\beta,\theta))$, the price cut $D(\beta,\delta)$ is positive for all T and W such that $T \in [0, \bar{W}(\delta,\theta)]$ and $W \geq \left(B - e^L\right)/\theta + \left(q - c^L\right)$ (by (12)). The price cut is therefore increasing in W and decreasing in T (since $1/\beta > 1 > \delta(1-p)/1-\delta p$). To obtain the minimum equilibrium price cut necessary for sustaining high-quality production, thus maximizing the value of noncontrolling share, we set $W = \left(B - e^L\right)/\theta + \left(q - c^L\right)$ and $T = \bar{W}(\delta,\theta)$. Substituting these into the formula of price discount (15), and using (6), the value of noncontrolling shares in the optimal equilibrium is given by

$$\bar{U} = \left(p - c^H\right) - \delta\frac{1-p}{1-\delta}\left\{\frac{\frac{e^H - e^L}{\theta} + c^H - c^L}{p-q}\left[\beta^{-1}\left(\delta^{-1} - q\right) - (1-q)\right] - (p-q)\left(\beta^{-1} - 1\right)\right\}. \tag{16}$$

Note that by setting $T = \bar{W}(\delta,\theta)$, we also achieve the upper bound on the equilibrium value of controlling shares $\bar{V}_0$. Moreover, it can be readily verified that whenever $\delta \in (\hat{\delta}(\theta), \tilde{\delta}(\beta,\theta))$,

$$\bar{U} \in \left(\left(p - c^H\right) - (1-p)\left[\frac{\frac{e^H - e^L}{\theta} + c^H - c^L}{p-q}\right], p - c^H\right) = \left(\bar{U}_0, p - c^H\right).$$

In sum, if $\delta \in [\hat{\delta}(\theta), \delta(\beta,\theta))$, $\bar{U}$ is given by (16) and $\bar{V} = \bar{V}_0$ in the optimal equilibrium. The equilibrium takes the form described in the text, with $T = \bar{W}(\delta,\theta)$. On the off-equilibrium path in which the controlling shares are retained by the incumbent, a price cut of $\left\{\bar{V}_0 - \left[\left(B - e^L\right)/\theta + \left(q - c^L\right)\right]\right\}/[(1-\delta)(1-\beta)]$ is offered to customers for one period. ■

Proof of Corollary 1. According to Proposition 2, if $\delta \geq \tilde{\delta}(\beta,\theta)$, then $\bar{V} = \bar{V}_0$, and $\bar{U} = p - c^H$. The control premium $\Delta^H = \bar{V} - \bar{U}$ is then equal to $\bar{V}_0 - \left(p - c^H\right)$.

Next, if $\delta \in (\hat{\delta}(\theta), \tilde{\delta}(\beta,\theta))$, then $\bar{V}$ and T remain at $\bar{V}_0$ and $\bar{W}(\delta,\theta)$, respectively. The value of a noncontrolling share is given by $\bar{U} = p - c^H - \delta(1-p) D(\beta,\theta)$. Direct substitution then yields the following expressions for Δ^H:

$$\Delta^H = \begin{cases} \frac{B-e^H}{\theta} - \frac{1-p}{p-q}\left(\frac{e^H-e^L}{\theta} + c^H - c^L\right) & \text{if } \delta \geq \tilde{\delta}(\beta,\theta) \\ \frac{B-e^H}{\theta} - \frac{\delta(1-p)\left(\beta^{-1}-1\right)}{1-\delta}\left[(p-q) - \frac{\delta^{-1}-q}{p-q}\left(\frac{e^H-e^L}{\theta} + c^H - c^L\right)\right] & \text{if } \delta \in \left(\hat{\delta}(\theta), \tilde{\delta}(\beta,\theta)\right) \end{cases}.$$

Note that the term in the bracket is positive whenever $\delta > \hat{\delta}(\theta)$. It is clear that $\Delta^H < 0$ whenever B is sufficiently small. ■

Proof of Corollary 2. As shown in the proof of Corollary 1, if $\delta \geq \tilde{\delta}(\beta,\theta)$, the optimal equilibrium has $\Delta^H = \bar{V}_0 - \left(p - c^H\right)$. Moreover, as shown in the proof of Proposition 2, the optimal equilibrium has $T = \bar{W}(\delta,\theta)$. Denote by $\underline{U}$ the value of a noncontrolling share following a bad outcome (see (8)). As $\underline{U} = \bar{U} = p - c^H$ in this case, $\Delta^H > \Delta^L$ follows from the fact that $\bar{V}_0 > \bar{W}(\delta,\theta)$.

Next, if $\delta \in \left(\hat{\delta}(\theta), \tilde{\delta}(\beta,\theta)\right)$, then $\bar{V}$ and T remain at $\bar{V}_0$ and $\bar{W}(\delta,\theta)$, respectively. The expressions for $\bar{U}$ and $\underline{U}$ are given by (8). The difference in the control premiums $\Delta^H - \Delta^L$ is given by

$$\Delta^H - \Delta^L = \left(\bar{V}_0 - \bar{U}\right) - \left(\bar{W}(\delta,\theta) - \underline{U}\right) = \hat{W} - \bar{W}(\delta,\theta).$$

As $\hat{W} > T = \bar{W}(\delta,\theta)$, we obtain that $\Delta^H > \Delta^L$. ■

Proof of Corollary 4. Fix a $\theta \geq \underline{\underline{\theta}}$. If $\delta \leq \hat{\delta}(\theta)$, then β has no effect on $\hat{W}$, and hence no effect on the control premium and the post-acquisition accounting profit. For the rest of the proof, we consider the case $\delta > \hat{\delta}(\theta)$.

Recall that $\tilde{\delta}(0,\theta) = \hat{\delta}(\theta)$ and that $\tilde{\delta}(\beta,\theta)$ is strictly increasing in β. We can thus define its inverse: let $\bar{\beta}(\delta,\theta)$ be the solution in β to $\delta = \tilde{\delta}(\beta,\theta)$. When $\beta \leq \bar{\beta}(\delta,\theta)$, we have $\delta \geq \tilde{\delta}(\beta,\theta)$. Therefore, according to the proof of Proposition 2, $\hat{W} = \bar{V}_0$ and $T = \bar{W}(\delta,\theta)$. Both the control premium, $T - \underline{U}$, and the post-acquisition profit, $p - c^H$, are locally invariant to β.

When $\beta > \bar{\beta}(\delta,\theta)$, we have $\delta < \tilde{\delta}(\beta,\theta)$. According to the proof of Proposition 2, T remains at $\bar{W}(\delta,\theta)$ and

$$\hat{W} = \frac{\bar{W}(\delta,\theta) - (1-\beta)\left(\frac{B-e^L}{\theta} + q - c^L\right)}{\beta}.$$

Therefore, $\hat{W}$ is constant in β for all $\beta \leq \bar{\beta}(\delta,\theta)$ and is strictly decreasing in β for $\beta \in \left(\bar{\beta}(\delta,\theta), 1\right)$. The result then follows because the control premium varies inversely with $\hat{W}$ while the post-acquisition accounting profit varies positively with $\hat{W}$. ■

Proof of Corollary 5. It is straightforward that the inequality $\delta \geq \tilde{\delta}(\beta,\theta)$ can be rearranged into

$\theta \geq \tilde{\theta}(\beta, \delta)$ for some function $\tilde{\theta}$. If $\theta \geq \tilde{\theta}(\beta, \delta)$, the control premium is given by

$$T - \underline{U} = \bar{W}(\delta, \theta) - \left(p - c^H\right) = -\frac{(1 - \delta p)}{\delta (p - q)} \left(\frac{e^H - e^L}{\theta} + c^H - c^L\right).$$

Thus, the control premium is increasing in θ. If $\theta < \tilde{\theta}(\beta, \delta)$, then the control premium is given by:

$$T - \underline{U} = \bar{W}(\delta, \theta) - \left(p - c^H\right) + (1 - \delta p) D(\beta, \theta).$$

Substituting (15) into the equation above (with $W = \left(B - e^L\right)/\theta + \left(q - c^L\right)$ and $T = \bar{W}(\delta, \theta)$), it can be shown that the coefficient of the term $\left(e^H - e^L\right)/\theta$ in the expression for the control premium is $[(1 - \beta)/\beta] \times [(1 - \delta q)(1 - \delta p)] / [\delta (1 - \delta)(p - q)] > 0$. Thus, the control premium is decreasing in θ whenever $\theta < \tilde{\theta}(\beta, \delta)$. ■

Proof of Proposition 3. (i) For ease of exoposition, define $S(\theta) \equiv \theta \bar{V} + (1 - \theta)\bar{U}$ as the total shareholder value in the optimal equilibrium, as a function of the size of the controlling block θ. Note that both the values $\bar{V}$ and $\bar{U}$ are functions of θ.

First, it is immediately apparent that if $\delta = \hat{\delta}(1)$, θ^* is unique and equal to one as any lower θ cannot support high-quality production. For the same reason, for any $\delta \in \left(\hat{\delta}(1), 1\right)$, it is suboptimal to set θ below $\underline{\theta}(\delta)$.

Next, when $\theta = \underline{\theta}(\delta)$ or equivalently, $\delta = \hat{\delta}(\theta)$, we have that $\bar{U} = \bar{U}_0$ and $\bar{V} = \bar{V}_0$, according to Proposition 2. Therefore, $\bar{V} - \bar{U} = \left(B - e^H\right)/\underline{\theta}(\delta)$. Using this fact, the derivative of $S(\theta)$ evaluated at $\theta = \underline{\theta}(\delta)$ is given by

$$\left.\frac{d}{d\theta} S(\theta)\right|_{\theta = \underline{\theta}(\delta)} = \frac{1 - p}{p - q} \left(\frac{e^H - e^L}{\underline{\theta}(\delta)}\right) \left(1 + \frac{\underline{\theta}(\delta)^{-1} - 1}{\delta^{-1} - 1} \left[\beta^{-1}\left(\delta^{-1} - q\right) - (1 - q)\right]\right) > 0.$$

Therefore, the optimal ownership structure θ^* strictly exceeds $\underline{\theta}(\delta)$.

Moreover, according to Proposition 2, if $\bar{\theta}(\delta, \beta) < 1$ and $\theta \geq \bar{\theta}(\delta, \beta)$, then $\bar{U} = p - c^H$ and $\bar{V} = \bar{V}_0$. This gives

$$S(\theta) = B - e^H + \left(p - c^H\right) - \frac{1 - p}{p - q}\left[e^H - e^L + \theta\left(c^H - c^L\right)\right].$$

Therefore, $S(\theta)$ is strictly decreasing for all $\theta \geq \bar{\theta}(\delta, \beta)$ and it is suboptimal to set θ above $\bar{\theta}(\delta, \beta)$. We have thus established that $\theta^*(\delta) \in (\underline{\theta}(\delta), \bar{\theta}(\delta, \beta)]$.

To see why $\theta^*(\delta)$ is unique when $\delta \in \left(\hat{\delta}(1), 1\right)$, recall by definitions, $\theta \in (\underline{\theta}(\delta), \bar{\theta}(\delta, \beta)]$ if and only if $\delta \in (\hat{\delta}(\theta), \tilde{\delta}(\beta, \theta)]$. Using part (iii) of Proposition 2, total shareholder value for this range of θ is given by

$$S(\theta)=\theta\left[\frac{B-e^H}{\theta}+\left(p-c^H\right)-\frac{1-p}{p-q}\left(\frac{e^H-e^L}{\theta}+c^H-c^L\right)\right]$$
$$+(1-\theta)\left[\left(p-c^H\right)-\delta\frac{1-p}{1-\delta}\left\{\frac{\frac{e^H-e^L}{\theta}+c^H-c^L}{p-q}\left[\beta^{-1}\left(\delta^{-1}-q\right)-(1-q)\right]-(p-q)\left(\beta^{-1}-1\right)\right\}\right].$$

Direct computation gives the second derivative:

$$\frac{d^2S}{d\theta^2}=-2\theta^{-3}\left(\delta\frac{1-p}{1-\delta}\frac{e^H-e^L}{p-q}\right)\left(\beta^{-1}\left(\delta^{-1}-q\right)-(1-q)\right)<0.$$

As S is strictly concave in θ in the interval $[\underline{\theta}(\delta),\bar{\theta}(\delta,\beta)]$, θ^* is unique when $\delta\in\left(\hat{\delta}(1),1\right)$.

Finally, it is straightforward to verify that both $\underline{\theta}(\delta)\to\underline{\underline{\theta}}$ and $\bar{\theta}(\delta,\beta)\to\underline{\underline{\theta}}$ as $\delta\to 1$. Therefore, θ^* converges to $\underline{\underline{\theta}}$ as $\delta\to 1$.

(ii) By the strict concavity of $S(\theta)$ in the interval $[\underline{\theta}(\delta),\bar{\theta}(\delta,\beta)]$, θ^* is characterized by the first order condition $S'(\theta^*)=0$, whenever θ^* lies in the interior of the interval. In this case,

$$\theta^*=\tilde{\theta}(\delta,\beta)\equiv\sqrt{\frac{\left(e^H-e^L\right)(1-\delta q-\delta\beta(1-q))}{(1-\beta)\left[\delta(p-q)^2-\left(c^H-c^L\right)(1-\delta q)\right]}}.$$

From the proof of part (i), we know that the optimal ownership structure θ^* is given by

$$\theta^*=\min\left\{\bar{\theta}(\delta,\beta),\tilde{\theta}(\delta,\beta)\right\},$$

where

$$\bar{\theta}(\delta,\beta)\equiv\begin{cases}\frac{\left(e^H-e^L\right)(1-\delta q-\delta\beta(1-q))}{\delta(1-\beta)(p-q)^2-(1-\delta q-\delta\beta(1-q))\left(c^H-c^L\right)} & \text{if } \delta\in\left(\tilde{\delta}(\beta,1),1\right)\\ 1 & \text{if } \delta\le\tilde{\delta}(\beta,1)\end{cases}.$$

Here, $\bar{\theta}(\delta,\cdot)$ is simply the inverse of $\tilde{\delta}(\beta,\cdot)$ whenever $\delta\geq\tilde{\delta}(\beta,1)$. It is obvious that both $\bar{\theta}$ and $\tilde{\theta}$ are strictly increasing in e^H-e^L and c^H-c^L. Therefore, θ^* is weakly increasing in e^H-e^L and c^H-c^L, strictly so if $\delta\in\left(\tilde{\delta}(\beta,1),1\right)$.

Furthermore, direct computation gives.

$$\frac{\partial\bar{\theta}}{\partial\delta}=\frac{-\left(e^H-e^L\right)(1-\beta)(p-q)^2}{\left(\delta(1-\beta)(p-q)^2-(1-\delta(q+\beta(1-q)))\left(c^H-c^L\right)\right)^2}<0,\text{ and}$$
$$\frac{\partial\tilde{\theta}}{\partial\delta}=\frac{1}{2\theta^*}\frac{e^H-e^L}{1-\beta}\frac{-(p-q)^2+\left(c^H-c^L\right)\beta(1-q)}{\left(\delta(p-q)^2-\left(c^H-c^L\right)(1-\delta q)\right)^2}<0.$$

Thus, θ^* is weakly decreasing in δ, and strictly so if $\delta \in \left(\tilde{\delta}(\beta, 1), 1\right)$. ■

Proof of Corollary 6. (i) Using the definitions in the proof of Proposition 3, the optimal ownership structure is strictly less than $\bar{\theta}(\delta, \beta)$ if and only if $\tilde{\theta}(\delta, \beta) < \bar{\theta}(\delta, \beta)$. Upon straightforward algebra manipulation, this inequality is equivalent to requiring both

$$c^H - c^L < \frac{1}{1-\delta q}\left[\delta(p-q)^2 - \left(e^H - e^L\right)\left(\frac{1-\delta q - \delta\beta(1-q)}{1-\beta}\right)\right] \equiv \bar{C}, \text{ and} \tag{17}$$

$$\begin{aligned} 0 \ > \ & \delta(1-\beta)^2(p-q)^2\left[\delta(p-q)^2 - \left(e^H - e^L\right)\left(\frac{1-q\delta-\delta\beta(1-q)}{1-\beta}\right)\right] \\ & +(1-\beta)(1-\delta q - \delta\beta(1-q))\left[(1-\delta q)\left(e^H - e^L\right) - 2\delta(p-q)^2\right]\left(c^H - c^L\right) \\ & +(1-\delta q - \delta\beta(1-q))^2\left(c^H - c^L\right)^2. \end{aligned} \tag{18}$$

If $c^H - c^L = 0$, inequality (17) holds only if the bracketed term is positive. However, this implies that inequality (18) does not hold. Therefore, $\theta^* = \bar{\theta}(\delta, \beta)$. On the other hand, if $e^H - e^L = 0$, then $\bar{\theta}(\delta, \beta) = 0$. As $\theta^* \leq \bar{\theta}(\delta, \beta)$, we have $\theta^* = 0$.

(ii) Let $\bar{E} \equiv \delta(1-\beta)(p-q)^2 / [1-\delta q - \delta\beta(1-q)]$ so that $\bar{C}$ defined in (17) is positive if and only if $e^H - e^L < \bar{E}$. Let $\varepsilon > 0$ be a small positive number. Substituting $e^H - e^L = \bar{E} - \varepsilon$ and $c^H - c^L = \bar{C} - \varepsilon^2$ into the right-hand side of inequality (18) gives

$$\begin{aligned} & -\varepsilon \times 2\beta\delta(1-\delta)(p-q)^2 \times \frac{1-q\delta-\delta\beta(1-q)}{1-\delta q} \\ & +\varepsilon^2 \times \delta(1-\beta)(p-q)^2[2\beta(1-\delta) + (1-\beta)(1-\delta q)] \\ & +\varepsilon^2 \times \left(\frac{1-q\delta-\delta\beta(1-q)}{(1-\delta q)(1-\beta)} - \varepsilon\right) \\ & \times \left[\frac{\beta(1-\delta)}{1-\beta}\frac{1-\delta q-\delta\beta+q\beta\delta}{1-q\delta}((1-\delta)(2-\beta) + 2\delta(1-\beta)(1-q)) - \varepsilon(1-\delta q-\delta\beta(1-q))^2\right]. \end{aligned}$$

It is apparent that the expression above is negative for ε sufficiently small. By continuity, inequality (18) holds for $e^H - e^L$ and $c^H - c^L$ in a region below but close to $\bar{E}$ and $\bar{C}$, respectively. ■

Alternative Equilibrium Selection Recall the benchmark setting in Section 3.1 that the controlling block never changes hands, and take a stationary PPE in which high-quality production occurs on the equilibrium path, and the value of the controlling share W_0 following a bad outcome exceeds $\left(B - e^L\right)/\theta + q - c^L$. Let $P \leq p$ be the firm's product price in the normal phase (i.e., after a good product outcome). Note that there is a one-to-one mapping between the value W_0 and the product price in the on-path punishment phase, which is triggered after a bad product outcome and lasts only one period. It follows from the recursive definition of the continuation payoff V that the product-price discount in the on-path punishment phase is $\left(\left(B-e^H\right)/\theta+\left(P-c^H\right)-W_0\right)/\left(1-\delta p\right)$. The following result, counterpart to Proposition 1, can be obtained by a similar derivation.

Proposition 4 *Consider the following strategy of the firm. It engages in high-quality production on the equilibrium path, charges a price P in the normal phase, and offers a price discount $\left[\left(B-e^H\right)/\theta+\left(P-c^H\right)-W_0\right.$ in the on-path punishment phase, which is triggered if and only if a bad product outcome occured in the last period. Any deviation will trigger the off-path punishment phase in which it perpetually engages in low-quality production and prices at q. Customers are willing to pay up to P in the normal phase, demands the price discount above in the on-path punishment phase, and are willing to pay only q in the off-path punishment phase.*

The strategies outlined above constitute a PPE, provided that

$$
\begin{aligned}
P &\geq q+(1-q)\left(e^H-e^L+c^H-c^L\right)/(p-q),\\
\delta &\geq \hat{\delta}(P,\theta)\equiv\left(\frac{(p-q)(P-q)}{\left(e^H-e^L\right)/\theta+c^H-c^L}+q\right)^{-1}, \text{ and}\\
W_0 &\in \left[\frac{B-e^L}{\theta}+q-c^L, \frac{B-e^H}{\theta}+P-c^H-\frac{1-\delta p}{\delta(p-q)}\left(\frac{e^H-e^L}{\theta}+c^H-c^L\right)\right].
\end{aligned}
$$

In this equilibrium, the value of a controlling share, the value of a noncontrolling share and the total shareholder value are respectively

$$
\begin{aligned}
V_0 &= \frac{B-e^H}{\theta}+\left(P-c^H\right)-\frac{\delta(1-p)}{1-\delta p}\left(\frac{B-e^H}{\theta}+\left(P-c^H\right)-W_0\right);\\
U_0 &= \left(P-c^H\right)-\frac{\delta(1-p)}{1-\delta p}\left(\frac{B-e^H}{\theta}+\left(P-c^H\right)-W_0\right); \text{ and}\\
S_0 &= B-e^H+P-c^H-\frac{\delta(1-p)}{1-\delta p}\left(\frac{B-e^H}{\theta}+\left(P-c^H\right)-W_0\right).
\end{aligned}
$$

We thus obtain a class of equilibria, each characterized by a pair of values P and W_0 (that satisfies the conditions in the proposition above). Note that the optimal equilibrium considered in the text has P and W_0 set at their respective maximum values compatible with high-quality production.

Now suppose negotiated block trades are feasible, as in Section 3.2 of the text. Recall that W is the value of a controlling share if the controlling block is retained by the incumbent controlling shareholder, and that $\hat{W}$ is the corresponding value when the controlling block is sold to the new entrepreneur. The block trade takes place through Nash bargaining with the incumbent's bargaining power being β.

Take a pair of values (P, W_0) that satisfies the conditions in the proposition above and consider an equilibrium with the same structure as the one outlined in the text (beginning of Section 3.2), with

$W = \left(B - e^L\right)/\theta + q - c^L$ and $\hat{W} = \beta^{-1} W_0 - \left(\beta^{-1} - 1\right)\left(\left(B - e^L\right)/\theta + q - c^L\right)$. It is immediate to verify that (i) $W_0 > \left(B - e^L\right)/\theta + q - c^L$ implies that $\hat{W} > W$, and (ii) Nash bargaining implies $T = W_0$. Moreover, customers' behaviors in the normal phase are unchanged, so the value of the controlling shares remain at V_0. As a product failure triggers the on-path punishment phase which lowers the value of the controlling share to W_0, the controlling shareholder faces identical incentives as in the case of no controlling-block turnover, so high-quality production can still be sustained. The value of noncontrolling shares is now given by

$$U = \left(P - c^H\right) - \delta\left(1 - p\right)\frac{V - \hat{W}}{1 - \delta} > \left(P - c^H\right) - \delta\left(1 - p\right)\frac{V - W_0}{1 - \delta} = U_0.$$

The key driver for the improvement in firm profit by the turnover of the controlling shareholder is therefore the preferential treatment by customers towards the incoming controlling shareholder. Such a preferential treatment can be supported as an equilibrium outcome because the incoming controlling shareholder is not responsible for the firm's bad product outcome before the turnover. Moreover, Nash bargaining in block trades implies that the incumbent does not receive the full surplus of trade and thus could still be sufficiently punished for the previous bad product outcome.

Most of the empirical predictions reported in Section 4 hold for this class of equilibria. First, in the equilibrium considered here, the control premium during the normal phase can be expressed as

$$\Delta^H = \underbrace{\frac{B - e^H}{\theta}}_{\text{net private benefit of control}} - \underbrace{\frac{\delta}{1 - \delta}\left(\beta^{-1} - 1\right)\left(1 - p\right)\left(W_0 - \left(\frac{B - e^L}{\theta} + q - c^L\right)\right)}_{\text{endogenous cost of control}}.$$

It is straightforward to see from the expression above that the control premium Δ^H could be negative if the endogenous cost of control exceeds the net private benefit of control. In other words, Corollary 1 still holds, with $B^* = e^H + \left[\delta/\left(1 - \delta\right)\right] \times \left(\beta^{-1} - 1\right)\left(1 - p\right)\left(\theta W_0 - \left(B - e^L + \theta\left(q - c^L\right)\right)\right)$.

The control premium in the on-path punishment phase is given by $\Delta^L = T - \underline{U}$, or equivalently,

$$\Delta^L = W - \left(\left(P - c^H\right) - \left(1 - \delta p\right)\frac{V - \hat{W}}{1 - \delta}\right).$$

By comparing Δ^H and Δ^L, we have

$$\Delta^H - \Delta^L = \left(\beta^{-1} - 1\right)\left(W_0 - \left(\frac{B - e^L}{\theta} + q - c^L\right)\right) > 0.$$

Therefore, the control premium is lower following a bad outcome, and Corollary 2 remains valid.

By comparing the trading of the controlling block following a good outcome with that following a bad outcome, it is clear from the inequality above that a block transaction at a lower premium (or larger discount) is associated with a stronger performance improvement, so Corollary 3 remains valid.

We can also consider the effects of changes in other model parameters, such as β and θ, within this class of equilibria. To this end, we maintain the assumption that the equilibrium values of P, W_0, and W are fixed as above. First, as $\hat{W}$ varies inversely with β, an increase in β raises the control premium in the block transaction, but lowers the firm's post-turnover profit. Therefore, Corollary 4 still holds in this class of equilibria.

Next, the determination of the optimal ownership structure clearly relies on selecting the optimal equilibrium. However, the tradeoff of managing the controlling shareholder's moral hazard problem and mitigating the endogenous cost of corporate control remains relevant within the class of equilibria considered here. A lower value of θ necessitates a larger destruction of firm profit in order to sustain the incentives for high quality production, so the value of noncontrolling shares U goes down. Specifically,

$$\begin{aligned} U &= \left(P - c^H\right) - \delta(1-p)\frac{V - \hat{W}}{1-\delta} \\ &= \left(P - c^H\right) - \delta(1-p)\left(\frac{V - W_0}{1-\delta} - \frac{\hat{W} - W_0}{1-\delta}\right) \\ &= \left(P - c^H\right) - \delta(1-p)\left(\begin{array}{c} \frac{1}{1-\delta p}\left(\frac{B-e^H}{\theta} + \left(P - c^H\right) - W_0\right) \\ -\frac{\beta^{-1}-1}{1-\delta}\left(W_0 - \left(\frac{B-e^L}{\theta} + q - c^L\right)\right) \end{array}\right), \end{aligned}$$

and it is clear that U is increasing in θ. On the other hand, assuming for simplicity that $B = e^H$, the total cost of corporate control $-\theta\Delta^H$ is given by

$$\frac{\delta}{1-\delta}\left(\beta^{-1} - 1\right)(1-p)\left(\theta\left(W_0 - \left(q - c^L\right)\right) - \left(B - e^L\right)\right),$$

which also gets smaller as θ goes down.

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