

Strategic Incentive Systems:
A Theoretical and Empirical Investigation of
Managerial Incentives and Competitive Interaction

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Abstract

Competitive strategy has typically dealt with firms as if they consist of unitary actors, while, in fact, individual managers within the firm may have different interests. My dissertation addresses this shortcoming by exploring whether and how internal firm characteristics – such as compensation schemes, organizational structure, and ownership form – affect managerial incentives, which, in turn, affect how firms compete. An idea central to the dissertation is that delegation of authority within the firm can be used as a strategic commitment device.

The theoretical part of the dissertation uses a game-theoretical model to explore the relationship between organizational design and the intensity of rivalry. Previous studies have found that firms may use their organizational design to commit to behaving aggressively if competition takes place in strategic substitutes. This typically leads to a prisoner's dilemma in which firms behave too aggressively and industry profits decline. In this study, I show that the interaction between multiple elements of organizational design, i.e., compensation schemes and organizational structure, may lead to endogenous heterogeneity in incentives and a reduction, rather than an increase, in the intensity of rivalry. This is an important finding because it shows how firm heterogeneity can solve the fore mentioned prisoner's dilemma.

The empirical part of the dissertation uses a proprietary dataset of the Texas hotel industry to empirically investigate how ownership forms affect managerial incentives and pricing in different competitive contexts. I explore how the difference in ownership form between franchised and company-owned units influences the incentives of the managers who take the day-to-day decisions that constitute interfirm rivalry. I show that chains with company-owned units may restrict decision-making of local units as a credible commitment device to maintain high prices. Furthermore, I show that the payment of royalty fees reduces the net available revenues of franchisees, which provides an incentive to increase the price they charge to customers. By elucidating the competitive consequences of ownership, this study allows firms to take these consequences into consideration when determining the ownership structure of local units.

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1. Introduction

This dissertation investigates competition between firms; more specifically, it examines the antecedents of the *intensity* of competition. While competition is one of the most fundamental aspects of our economy, it is also one of the most difficult phenomena to fully understand. Why do some firms, under certain circumstances, compete head-to-head, sacrificing profits, seemingly to improve their position *vis-à-vis* their competitors, while, in other circumstances, firms appear to behave cooperatively, avoiding cut-throat competitive behavior? This dissertation aims at exploring whether organizational characteristics internal to the firm, such as the organizational structure, the compensation systems in use, and the ownership form, affect the intensity of competition.

Consider an example from a recent issue (May 24, 2005) of Wall Street Journal, which discusses the growing intensity of rivalry in the Nordic telecommunications industry.

Telenor ASA said it would spend around US\$1 billion to buy high-speed Internet-service providers in Sweden and Denmark to strengthen its existing Nordic operations and gain access to the fast growth of broadband services in the region. Analysts said the move could intensify rivalry in the already competitive Nordic markets. All three incumbents – Telenor, TeliaSonera, and TDC – saw domestic fixed-line revenue fall last year as prices slipped and as consumers increasingly used mobile phones to make calls.

Next, consider the following contrasting example in the same newspaper.

In the US, makers of so-called rigid packaging – think soda cans and beer bottles – have been on a roll. (...) The secret is pricing power. Rigid packaging is dominated by a relative handful of players, who are disciplined about limiting capacity.

These examples show the extent to which industries can differ in their intensity of competition, significantly impacting their profitability. The reason why the intensity

of competition is so different from one industry to another is often subtle and only partially understood.

The theoretical reasoning in this dissertation is highly influenced by the field of game theory. Cournot (1838, “Recherches sur les Pincipes Mathématiques de la Théorie des Richesses”) and Bertrand (1883, “Théorie Mathématique de la Richesse Sociale”) introduced economic tools that allowed thinking about strategic interaction: the effect of one firm’s actions on other firms’ profits and actions. The study of industrial organization applied these economic tools to the investigation of the rivalry between firms operating in the same industry (e.g., Bain, 1956; Tirole, 1988; and Vives, 1999).

The strategy field’s central concern is firm performance. One of the earliest contributions to the strategy field is what is now called the “design school” (e.g., Selznick, 1957; Chandler, 1962; Andrews, 1971) using the SWOT analysis to ensure the fit between the firm (its strengths and weaknesses) and its environment (the opportunities and threats). Within the strategy field, the “positioning school” (e.g., Porter, 1980) highlights the importance of the intensity of rivalry as one of the five forces shaping industry attractiveness.¹ Another important contribution to the strategy field is the “strategic groups literature” (e.g., Hatten and Schendel, 1977), which shows that not only industry membership but also strategic similarity are important explanatory variables of the intensity of rivalry and firm profitability. The “resource-based view”, finally, underlines the importance of firm heterogeneity and its impact on firm profitability (Lippman and Rumelt, 1982; Wernerfelt, 1984; Dierickx and Cool, 1989).

This dissertation draws on the above-mentioned literatures in its attempt to further the understanding of the forces that drive the intensity of competition. By linking internal firm characteristics with interfirm rivalry, this dissertation connects competition-oriented fields such as game theory, industrial organization, the position school, and the strategic-groups literature, with strategy fields that specifically pay attention to the internal firm organization, such as the design school and the

¹In this dissertation, the terms *competition* and *rivalry* are used interchangeably.

resource-based view.

In many industries, firms with different organizational design characteristics (such as ownership forms, reward systems, and organizational structures) compete head-to-head in the product market. In banking, for example, for-profit banks compete with not-for-profit credit unions. In the hotel industry, independent hotels compete with company-owned and franchised units of hotel chains. In higher education, private and public institutions openly compete for students and faculty.

Competition among different organizational forms has been primarily the subject of organizational theories, such as transaction cost economics, agency theory, organizational ecology, contingency theory, etc. In general, these theories propose adaptation and selection mechanisms whereby some organizational forms gain advantages over others. Yet, these theories have often glossed over how organizational forms may interact in oligopolistic competitive contexts. The arguments about competitive selection often assume a “perfect competition” context, where the intensity of rivalry is exogenously determined, and only superior efficiency determines the competitive success of organizational forms. The argument has been that competitive selection is determined by “economizing” rather than “strategizing” (Williamson, 1991). The strategic interactions among organizational forms have been ignored.

Yet, oligopolistic competitive situations are common, either because of industry consolidation and the ensuing high concentration (e.g., in airframes or software), or because competition is localized among few units in a narrow geography or product niche (e.g., among airlines or hotels). In an oligopolistic context, each firm’s organizational design characteristics affect the way it competes, and thus may change the competitive context faced by other organizations. In situations of oligopolistic competition, competitive outcomes may not be determined by efficiency alone, but also by how the organizational forms influence competitive postures and competitive interactions. Organizational forms represent commitments to particular strategic objectives or means of competing, since they may visibly restrict management choices and influence the responses of rivals. Some examples discussed in the literature include:

- Firms may commit to particular competitive strategies by delegating decisions to managers whose incentive systems are based on different strategic objectives. For example, firms who delegate competitive decisions to managers driven by market share objectives may be more committed to market dominance than firms with financial objectives, and may outperform financially-driven rivals (Fershtman and Judd, 1987). Chain-owned hotels may delegate competitive decisions to professional managers whose incentives are different from those of owners of independent hotels.
- Organizations may create horizontally- or vertically-related divisions to shift the incentives of divisional managers and influence their competitive behavior. For example, firms that create internal competition among units or divisions may be more resilient against entry and external competition than other firms more concerned about self-cannibalization (Baye, Crocker, and Ju, 1996; Christensen, 1997; Galunic and Eisenhardt, 1996). Firms that delegate vertically-interrelated pricing decisions to managers of different divisions may commit to less aggressive competitive behavior (because of double marginalization) than firms where decisions are integrated.

This dissertation examines the competitive behaviors of firms with different organizational forms. Interest in the effects of organizational forms (reward systems, organizational structures) on oligopolistic competitive behavior began in industrial organization in the mid-1980s (Fershtman and Judd, 1987; Sklivas, 1987; Vickers, 1985). Since then, a large body of formal game-theoretical modeling has accumulated in economics. Yet, empirical evidence illustrating the various competitive behaviors of firms with different organizational forms has been lacking. Thus, despite the intense theoretical effort in economics, the empirical validity and relevance of these theories remain to be determined. Empirical examination is a requirement for the widespread adoption of this perspective by strategy and organizational theory scholars.

This dissertation attempts to bridge the typical emphasis of strategy researchers

on market structure, competitive dynamics, and competitive advantage with an interest in organizational forms that is central to organizational theory. The study tries to advance an alternative mechanism to explain the differential performance and survival of different organizational forms. More specifically, this dissertation analyzes, both theoretically and empirically, the interaction between organizational design and ownership characteristics, managerial incentives, and product-market competition.

According to Webster’s New World Dictionary of the American Language (1964), an incentive (noun) is something that incites action; a stimulus; an encouragement (“incentive” comes from *incinere*: to sing). In the context of this dissertation, it will be argued that incentives are shaped by compensation systems, organizational structure, and ownership forms. Incentives, in turn, potentially affect managerial action, and, consequently, firm behavior.² Firm behavior, subsequently, affects competition and, therefore, determines the intensity of rivalry among market participants. Thus, the role of managerial incentives in the context of this dissertation can be depicted as follows (Figure 1.1):

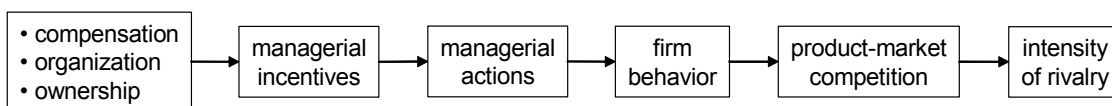


Figure 1.1 Causal link from organizational characteristics to intensity of rivalry.

Managerial incentives are a theoretical construct that link organizational characteristics with managerial actions. Compensation systems, organizational structure, and ownership affect the payoffs of the manager, which encourages certain actions rather than others. The value of introducing the *incentives* concept is that it highlights the idea that organizational characteristics drive actions indirectly through their effect on managerial payoffs, rather than directly.

A feedback loop from rivalry to incentives could exist if it is assumed that firms take the effects on competition into consideration when designing their managerial

²Firm behavior is defined as the subset of managerial actions that commit the firm *vis-à-vis* its environment, for example, through input contracts or through prices posted.

incentives. Thus, the feedback loop is based on the endogeneity of incentives to their anticipated effects on competition and performance. In other words, realizing the effect of incentives on competition, firms may shape their managers' incentives so as to benefit from the competitive effect of the incentives. The feedback loop is expected to be most salient in oligopolistic contexts, in which strategic interaction is most relevant.

Obviously, many other factors, not included in the figure above, influence compensation schemes, organizational structure, and ownership on the one hand, and the intensity of rivalry on the other. These factors, such as corporate strategy, efficiency and effectiveness considerations, agency concerns, industry characteristics, and regulatory environment, are treated as exogenously determined. The focus and boundaries of this study can therefore be depicted as follows (Figure 1.2):

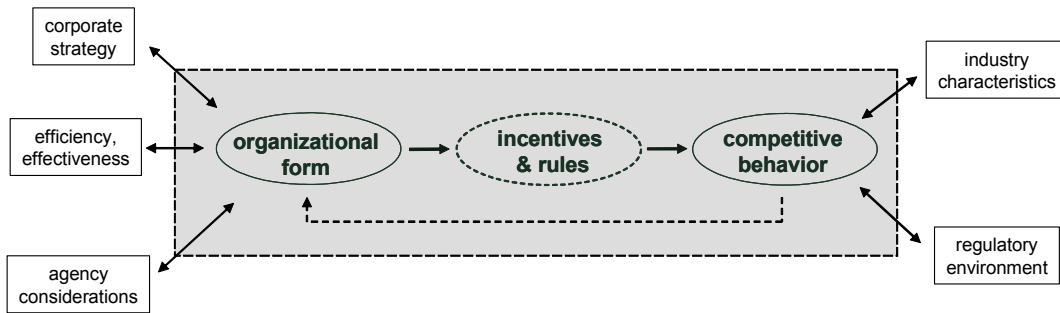


Figure 1.2 The focus and boundaries of this dissertation.

The interaction between incentives and competition is the focus of this dissertation, while the influences that lie outside the rectangle are considered exogenous to this study. The solid arrow from incentives to competition signifies the causal link between these two concepts, while the dashed line in the opposite direction represents the feedback loop, which endogenizes organizational characteristics.

The behavioral assumption of the actors used in this study is economic rationality. Actors, i.e., owners, managers, etc., are assumed to act as if they rationally maximize their utility function. Consequently, while acknowledging the potential importance of psychological or sociological aspects of managerial incentives, this dissertation does not elaborate on them.

This dissertation is structured as follows. A review of the theoretical and empirical literature on the strategic role of managerial incentives is included in Chapter 2. Chapter 3 contains a theoretical investigation of strategic incentives theory, exploring the interaction between organizational design and competitive interaction. In Chapter 4, an empirical test of strategic incentives theory is carried out, using data from the Texas hotel industry to examine the link between ownership forms and competitive behavior. Chapter 5 provides a conclusion and discussion.

2. Literature Review

In this chapter, the literature on strategic incentives is reviewed. The theoretical and empirical literatures are explored in turn.

2.1. Theoretical Strategic Incentives Literature

First, we discuss three papers that are considered the seminal articles in this literature. Then, we briefly discuss the subsequent literature, focusing on various aspects of strategic incentives, such as compensation schemes, ownership, and organizational structure. Gimeno, Dial and Sengul (2001) provide a comprehensive review of the strategic incentives literature. They show that this theory has relevance not only for economic theory but also for management scholars and practitioners by providing the possibility to create a competitive advantage.

Seminal papers. The seminal papers in the strategic incentives (also called strategic delegation) literature are Fershtman and Judd (1987), Sklivas (1987), and Vickers (1985) (hereafter referred to as FJSV). These authors show that firms that compete in imperfectly competitive product markets may want to provide their managers with incentives that are different from those aimed at achieving pure profit maximization. More specifically, depending on the strategic nature of the product-market competition, they may want to provide overly aggressive or overly soft incentives, benefiting from the strategic effect these incentives have on competition. In other words, firms use incentives as a strategic commitment device.

Fershtman and Judd (1987), in their article “Equilibrium Incentives in Oligopoly”, develop a two-stage model, with two firms. In the first stage, the firm owner determines the compensation scheme assigned to its manager. This scheme is a weighted average of firm profits and sales. In the second stage, managers compete on the product market. Competition can take either the form of strategic complements (price competition) or strategic substitutes (quantity competition). Fershtman and Judd show that, in equilibrium, owners incentivize their managers to produce more than in a one-stage game if product-market competition takes place in strategic

substitutes, and to produce less if competition takes place in strategic complements. In terms of the incentive scheme introduced by Fershtman and Judd, incentivizing to produce more is achieved by putting a positive weight on sales, while a negative weight on sales would provide the incentive to produce less. Defining aggressiveness as the amount of output produced, one can restate the main conclusion of Fershtman and Judd: the strategic use of incentive systems makes firms behave more aggressively in the case of strategic substitutes and less aggressively in the case of strategic complements.

The intuition behind this result is relatively simple and analogous to the Stackelberg reasoning. In the case of strategic complements, firm i wants to commit to a high output, because this will decrease the output of firm j – because of strategic substitutability – and firm i will benefit from a decrease in the output of firm j . In the case of strategic complements, the opposite happens. Firm i wants to commit to a high price (i.e., low output), because this will increase the price of firm j , which is beneficial to firm i .

The effect of strategic incentives can be understood by analyzing the reaction functions of the managers in the second stage of the game (adapted from Fershtman and Judd). The one-stage and second-stage reaction curves are depicted in Figure 2.1.

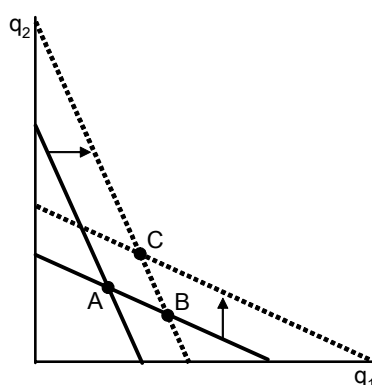


Figure 2.1 Incentives shift the managers' reaction curves.

From the above figure, it can be seen that if firm 1 uses strategic incentives, while firm 2 does not, firm 1's output increases and firm 2's output decreases (moving from A to B). Thus, in this asymmetric case, firm 1's profits increase, while those

of firm 2 decrease. However, if both firms use strategic incentives, they increase their output and, therefore, both firms' profits decrease. This is a typical example of the prisoner's dilemma that occurs in the case of strategic substitutes. Firms would be better off not using strategic incentives, but it is in each firm's individual interest to use strategic incentives, whether the rival uses strategic incentives or not.

Although Fershtman and Judd is the most cited of the three FJSV papers, Vickers (1985) was, in fact, the first paper published developing a strategic incentives model. Vickers introduces a model in which the incentive scheme is a weighted average of profits and output, rather than sales. The main conclusion ("more aggressiveness in substitutes, less aggressiveness in complements") also holds in the Vickers setup. Interestingly, Vickers links strategic incentives with a number of ideas that are followed up by subsequent research: relative performance evaluation (e.g., Salas Fumás, 1992), horizontal divisionalization (Faulí-Oller and Giralt, 1995), and vertical integration (Chapter 3 of this dissertation). Vickers also discusses an interesting implication of strategic incentives. If managers are incentivized to maximize an objective function that differs from normal profit maximization, do firms behave "as if they were seeking rationally to maximize their expected returns" (Friedman, 1953, p. 21)? Empirically, when one observes firm actions, one in fact analyzes managers' decisions. Vickers introduces the following terminology to explain this paradox. The author distinguishes between the expression " x is a u -maximizer" and " x maximizes u ". The first refers to x 's disposition, intention, or objective, while the second refers to the effect or result that x tends to bring about (Vickers, 1985, pp. 138-139). Vickers notes that "in games, it is almost always the case that u -maximizers do not maximize u ". In the case of strategic incentives, one could say that even if the owner is a profit maximizer, the firm's actions (as observed by an outsider) may not show behavior that is expected from a profit maximizer.

Following the seminal work of FJSV, a large number of theoretical articles have been published that apply the basic idea of strategic incentives theory on a number of specific areas (Gimeno, Dial, and Sengul count 148 citations of Fershtman and Judd, 1987, by June 2001). Here, we briefly review the major contributions the literature

has made regarding three main concepts that are of interest for the theoretical and empirical studies this dissertation encompasses: compensation schemes, ownership, and organizational structure.

Compensation schemes. Compensation schemes used in the strategic incentives literature include the weighted average of profits and sales or output, as in FJSV, and relative performance evaluation, as discussed by Nalebuff and Stiglitz (1983), Vickers (1985), Salas Fumás (1992), Faulí-Oller and Giralt (1995), Miller and Pazgal (2002), among others. The basic idea that sets relative performance evaluation apart from absolute performance evaluation is that the performance of the manager is compared to the performance of another unit. This other unit could be another division or department of the same firm (Faulí-Oller and Giralt, 1995), a specific competitor, or a peer group or industry average (Salas Fumás, 1992). Agency theory proposes a rationale for using relative performance evaluation by arguing that it reduces the noise in the firm's performance through the removal of shocks that are common to the industry. To accomplish the beneficial effect of noise reduction, the weight placed on the industry performance should be negative.

Relative performance evaluation is comparable to a weighted average of profits and sales/output in the sense that it allows the owner to make the manager *more* or *less* aggressive (more aggressive is defined, in accordance with the above, as producing more output). More specifically, if the weight on the unit of comparison is negative, the manager is incentivized to increase output, because increasing output damages the competitors, which increases the relative performance. Agency theory predicts the weight on rivals' profits to be negative, but in principle, a positive weight is possible, too. In the latter case, the manager is incentivized to maximize industry profits (as well as firm profits), which obviously lowers the firm's output. It is not surprising that the fundamental conclusion of strategic incentives holds in the case of relative performance evaluation: the strategic use of relative performance evaluation makes firms behave more aggressively in the case of strategic substitutes and less aggressively in the case of strategic complements (Salas Fumás, 1992).

An interesting aspect of compensation schemes is that the type of compensation

scheme used determines the specific way in which a firm's owner can shift the manager's reaction curve. The traditional scheme of a weighted average of profits and sales/output moves the reaction curve in or out but does not change the slope of the reaction curve. In contrast, the use of relative performance evaluation allows the owner not only to change the intercept but also the slope of the manager's reaction curve. Other compensation schemes, in which the degree of control by the owner increases further, also exist. Miller and Pazgal (2001) define a class of games in which the owner has unrestricted, independent control over the manager's reaction curve, which means that the owner can independently determine the slope and the intercept of the reaction curve. These authors show that the degree of control is positively related to the number of equilibria (as the degree of control rises, a multiplicity of equilibria occurs). An extreme case of response function manipulation is input control, in which the incentive is geared to taking a particular input choice. This is equivalent to a horizontal or vertical response function. This case is described by Fershtman, Judd and Kalai (1991), who conclude that all price-output combinations satisfying the demand function are equilibria.

The main conclusion of increasing aggressiveness in strategic substitutes (and decreasing aggressiveness in strategic complements) could thus be reversed by giving the owner a high degree of control over the manager's reaction curve. Indeed, Fershtman, Judd and Kalai show that perfect (noncooperative) collusion can be achieved in their case, which means a complete reversal of the standard aggressive outcome in strategic substitutes. In Chapter 3, we analyze the occurrence of the same phenomenon – decreased intensity of rivalry rather than the expected increase in rivalry in strategic substitutes – in a different context.

Ownership. Ownership affects who is the residual claimant, and therefore it affects managerial incentives. For example, vertically integrating versus separating two firms that have a supplier-buyer relationship affects the incentives of the residual claimants (Williamson, 1985). The vertical integration/separation literature is substantial, including such literatures as transaction cost economics and distribution channels (see, for example, Coughlan, Anderson, Stern, and El-Ansary, 2001). Ver-

tical integration/separation has been studied in a strategic (i.e., oligopoly) context by, among others, Bonanno and Vickers (1988), Coughlan and Wernerfelt (1989), McGuire and Staelin (1983), and Moorthy (1988). Vertical separation is found to have a softening effect on the intensity of rivalry. This is caused by the occurrence of double marginalization, i.e., consecutive members of the distribution chain sell above marginal costs, which drives up the price the final customer pays (Tirole, 1988, p. 174). Moorthy shows that firms may benefit from vertical separation (i.e., a manufacturer uses an independent sales channel) if, and only if, products are demand substitutes and competition takes place in strategic complements, or vice versa. To explore the intuition, let us focus on the first possibility (strategic complements). If firm i decentralizes, price i increases (due to double marginalization). Since competition takes place in strategic complements, in equilibrium, price j will also increase. An increase of price j will benefit firm i because products are demand substitutes. Note that prices increase, confirming the main strategic incentives conclusion of softening in the case of strategic complements.

Organizational Structure. Vertical relationships in a strategic context have been studied most notably within the industrial context, i.e., vertical integration and separation, determined by firm ownership, rather than within the firm. However, organizational structure also affects managerial incentives to the extent that division or department managers are made responsible and are compensated for the divisional or departmental performance. Chapter 3 illustrates an exception to this, as it studies vertical decentralization within the firm. Another example of the study of strategic, vertical relationships within the firm is Alles and Datar (1998). These authors discuss the strategic use of transfer pricing within the firm. Transfer pricing is typically associated with vertical decentralization, because accountability can only be established if departments pay a transfer price for the services they enjoy or products they buy from other departments. Alles and Datar let the CEO choose the transfer price. Note that this is different from the vertical separation case, in which there is obviously no CEO who determines the transfer price that maximizes overall chain profits. In fact, in the Alles and Datar article, by determining the

transfer price, the CEO shapes the incentives of the sales manager, equivalently to FJSV, who shape the manager's incentives by changing the compensation scheme. It is no surprise, therefore, that the main strategic incentives conclusion holds in the Alles and Datar case: when competition takes place in strategic complements, transfer prices are set above marginal costs, increasing the market price and, thus, decreasing the intensity of rivalry.

The strategic effect of horizontal decentralization has been studied by, among others, Faulí-Oller and Giralt (1995) and Sengul (2001). Faulí-Oller and Giralt study two competing firms that each consist of two separate product divisions (i.e., horizontal decentralization). They show that the firm provides cooperative incentives if there are significant economies of scope, while competitive incentives are provided in the case where the strategic effect overshadows the economies of scope (competition takes place in strategic substitutes). Sengul endogenizes divisionalization. He argues that horizontal divisionalization increases the intensity of competition and decreases the likelihood of new entry into the industry.

Strategic incentives and agency theory. Strategic incentives theory and agency theory both analyze the role of managerial incentives in organizations. Using an economic perspective, both theories study the behavior of managers (agents, players) within the organization and how their behavior is influenced by incentives. Incentives are used to make managers behave in a way desired by the firm's owner.

These two theories, however, differ in an important number of ways. In agency theory, incentives are used as a tool to align the interests of principals and agents (i.e., firms and managers). Agency theory explores the trade-off between interest alignment and risk sharing. In other words, profit incentives increase not only interest alignment but also the risk for the – normally – risk-averse agent. As such, uncertainty plays a crucial role in agency theory. Moreover, in agency theory, information is asymmetric, because the principal does not observe the agent's effort. However, agency theory ignores competitive interaction between firms. It focuses on the organization, and treats it as if it were the whole universe.

In contrast, in strategic incentives theory, incentives are not used to align inter-

ests between owners and managers in the same way as they are in agency theory. In general, incentives are not directed at profit maximization, but in fact steer the manager away from pure profit maximization, making him either more aggressive or more cooperative than a pure profit-maximizing agent would be.³ Generally, strategic incentives models do not allow for uncertainty, there is no asymmetric information or moral hazard, and there are no effort costs. Strategic incentives theory thus ignores the agency problem, while agency theory ignores competitive interaction.⁴

Obviously, without any uncertainty, the strategic use of incentives would not be possible. As Fershtman and Judd state, “if we had no uncertainty about the *ex post* state of the market, then our analysis would be unconvincing since there would be no justification for ignoring quantity- or price-indexed contracts that would force the usual Cournot and Bertrand outcomes” (1987, p. 930). At the same time, uncertainty is typically not modeled in the strategic incentives literature, while it is a crucial ingredient in any principal-agent model.

In contrast to this general rule, some articles dealing with strategic incentives have allowed for uncertainty, thus combining the strategic incentives and agency theories. Aggarwal and Samwick (1999) add uncertainty to a typical strategic incentives model to show that the main features of strategic incentives also hold in the presence of agency problems. Other work that incorporates uncertainty in the strategic incentives context include Bhardwaj (2001), Hermalin (1994), and Salas Fumás (1992). Interestingly, Hermalin shows that the agency problem may lead to heterogeneity in incentives with which managers are provided. In Chapter 3, we analyze heterogeneity in incentives in a different context.

³It could be argued that agency theory and strategic incentives theory look at two incentive dimensions that are orthogonal. Agency theory considers fixed pay versus performance dependent pay (“aggressive” or “high-powered” could be used to mean performance dependent). Strategic incentives theory considers incentives that move away from profit maximization, for example based on relative performance, or profits and sales (“aggressive” means more competitive than pure profit-maximization).

⁴Gimeno, Dial, and Sengul (2001) provide a conceptual framework that links incentives, efficiency, competitive interaction, and performance. They argue “we would expect efficiency considerations to be limiting factors in the pursuit of strategic delegation” (p. 25).

Strategic incentives and commitment. A key idea in strategic incentives theory is that incentives are used as strategic commitments. Besanko, Dranove, and Shanley (2000) argue that there are three necessary conditions for commitments to have a strategic effect: visibility, understandability, and credibility/irreversibility. Thus, incentives may not have a strategic effect if they are unobservable, not understood, or easily reversible. Whether this is true empirically, obviously depends on the specific situation. The observability of compensation contracts is confirmed in the literature (for example, Slade, 1993). The observation of ownership and organizational structure does not seem problematic. Moreover, Katz (1991) argues that even unobservable contracts allow for the strategic use of delegation, because of the observability of the agents' actions. We argue that organizational structure and compensation systems are embedded in the organization, and, therefore, not easily reversible.

2.2. Empirical Strategic Incentives Literature

The empirical evidence on the strategic effect and use of incentive systems has been scant, with an emphasis on some of the hypotheses mentioned above, while others have been ignored (see also Gimeno, Dial, and Sengul, 2001). As described in the Introduction, the main focus of strategic incentives theory is the interaction between incentives and competition in two ways: from incentives to competition (*do incentives affect competition?*), and the feedback loop from competition to incentives (*is the strategic effect taken into account, i.e., do competitive characteristics shape incentives?*). Here, we briefly review the main findings of the empirical literature, specifying whether the link is from incentives to competition, or the other way around. To our knowledge, no paper has yet simultaneously studied both links. For a classification of the empirical strategic incentives literature, please refer to Appendix A.

Compensation schemes. The (empirical) interest in compensation schemes originates from fields other than strategic incentives theory. Agency theory, for instance, has prompted a continuing interest in compensation schemes and manage-

rial incentives. For example, Gibbons and Murphy (1990), Janakiraman, Lambert, and Larcker (1992), Aggarwal and Samwick (1999), Chopin (1999), Joh (1999) all empirically assess the existence of relative performance evaluation as a managerial incentive system. The conclusions are mixed: some assert that relative performance is used in managerial compensation, while others assert the opposite. Only a few, however, explicitly study compensation in a strategic context. For example, Aggarwal and Samwick, and Joh find that the relative performance parameter (the weight μ placed on the industry performance) depends on concentration, linking competitive characteristics with compensation schemes (μ decreases as concentration increases). As far as we know, there is no empirical evidence of the reverse link, from compensation to rivalry (e.g., relative performance evaluation increases the intensity of rivalry and decreases prices). This is remarkable because, arguably, the effect of compensation schemes through managerial incentives on competition is at the heart of strategic incentives theory. One may thus say that the core of strategic incentives remains yet untested. One of the objectives of this dissertation is to propose a study that fills this empirical gap.

Ownership and channel structure. In the industrial organization literature, there is a long tradition of studying vertical control and its impact on competition, market power, market foreclosure, social welfare, etc. (see, for example, Tirole, 1988). It is not surprising, therefore, that there are several empirical studies dealing with the link between channel structure and competition. Lafontaine and Slade (1997) review this literature. Graddy (1997) and Kalnins and Lafontaine (1996) study fast-food franchise chains, Shepard (1993) and Slade (1998b) study the retail gasoline industry, while Slade (1998a) studies the beer market (pubs) in the UK. Several of these studies find (some) support for the assertion that vertical separation increases retail prices. This effect could be attributed to strategic incentives theory: vertical separation is used as a strategic device to commit to high prices with the objective of encouraging rivals to increase their price, too. However, the simple fact that prices are higher when vertical separation is compared with vertical integration does not necessarily imply that incentives are used in a strategic manner. Double

marginalization may increase retail prices, even in the absence of strategic intentions (Tirole, 1988, p. 174). Contrasting company-owned outlets with independent, vertically separated outlets thus amounts to introducing a wholesale price that is above marginal cost, which naturally has an increasing effect on the retail price. In the research design of the study that is proposed here, we aim at avoiding the compound of strategic incentives effects and double marginalization.

Kalnins and Lafontaine (1996) study the reverse link: how do competitive characteristics affect integration/separation? They conclude that franchising is used for reasons other than those proposed by strategic incentives theory. Slade (1998b) explores the link from demand characteristics to vertical control: the difference between own- and cross-price elasticity positively affects the likelihood of vertical separation. This could be interpreted as evidence of the competition-incentives link, because the strategic benefit from vertical separation is positively correlated with this difference.

Organizational structure. Articles that address organizational structure generally do not link it with competition. For example, Hill, Hitt, and Hoskisson (1992) analyze the fit between diversification strategy and organizational design. A notable example is a study of the movie industry by Corts (2001). This author finds that companies that release two movies in the same season take the negative externality (risk of cannibalization) into consideration, whether the movies are produced by the same or different divisions within the same company. Thus, in this case, divisionalization does not affect managerial behavior – there is no supporting evidence for strategic incentives theory.

2.3. Conclusion and Definitions

The literature on strategic incentives is appealing because it connects the study of the inside of the firm (organizational theory and organizational economics) with a study of the outside of the firm (competitive strategy). Research during the past 15 - 20 years has created a strategic incentives literature that expands the idea of using organizational characteristics to commit strategically to a broad variety of or-

ganizational characteristics and industrial settings. However, we conclude that the literature generally focuses on one specific characteristic, such as compensation or organizational structure, and, thus, ignores a possible interaction between organizational characteristics. In the next chapter, we aim to contribute to the literature by investigating this interaction, while discussing topics that have been raised in this section, such as heterogeneity in incentives, and degree of control. We will show that the interaction of organizational characteristics may reverse the outcome, decreasing the intensity of rivalry rather than increasing it, as is expected in the case of strategic substitutes.

Relative to the theoretical literature, empirical research has been sparse. There is some evidence of the use of compensation schemes that deviate from profit-maximization, but it is not sure whether this is for strategic or other reasons. Also, there is evidence that vertical separation affects pricing decisions, but this might, in some cases, be explained by non-strategic double marginalization. In Chapter 4, we conduct an empirical test of strategic incentives theory that addresses these and other concerns.

For clarity, we will list below definitions of some of the key concepts, in the list below, that are used in this study.

- **Complements/substitutes.** A game is characterized by *strategic complements* (*substitutes*) if the equilibrium action of player j moves in the same (opposite) direction, given a change in player i 's actions. The reaction curve is upwards (downwards) sloping in the case of strategic complements (substitutes). Cournot (quantity) competition generally constitutes an example of competition in strategic substitutes. Price competition with differentiated goods can be either strategic complements or substitutes, depending on the nature of the goods. If the goods are *product substitutes*, the actions are generally complements, and, if the goods are *complements*, the actions are substitutes.
- **Decentralization/centralization.** Decentralization is delegation of authority to (partially) independent units within the firm (either horizontal, i.e.,

divisions, or vertical, i.e., departments). Centralization is defined as the situation in which no delegation of authority takes place.

- **Incentives.** Stimulus that influences (managerial) actions. For example, compensation schemes affect the payoffs managers obtain in conjunction with a certain course of action. Therefore, compensation schemes shape managers' incentives.
- **Intensity of rivalry.** The intensity of rivalry is a mapping from concentration to (elasticity-adjusted) price-cost margins ("toughness of price competition", Sutton, 1991, p. 9). For example, given a certain level of concentration, the intensity of rivalry increases as prices decrease, volumes increase, etc.
- **Soft/aggressive.** Incentives are called aggressive (soft) if they encourage behavior that increases (decreases) the intensity of rivalry. (Also, the terms *cooperative* and *competitive* are used).

3. Theoretical Investigation of Managerial Incentives and Competitive Interaction

3.1. Introduction

In this chapter, we study the relationship between firms' organizational design and interfirm rivalry. Specifically, we explore how the *inside* of the firm—its actors, organization, and compensation systems—and the *outside* of the firm—product-market competition between rivals in the same industry—are interrelated. The objective of this study is to better understand both the forces shaping rivalry and those shaping organizational design.

A stream of economic research, referred to as *strategic incentives theory*, has examined how managerial incentives affect competitive interaction. The seminal papers in this field are Fershtman and Judd (1987), Sklivas (1987), and Vickers (1985). Typical strategic incentives models consist of a two-stage game. In the first stage, firms determine some element of the organizational design, e.g., the managers' compensation schemes or the organizational structure; in the second stage, managers compete in an imperfectly competitive product market.⁵ Organizational design serves as a commitment device, credibly binding the firm to more or less aggressive behavior. The main conclusion from this stream of research critically depends on the nature of competition. When firms choose output and, hence, choices are strategic substitutes, the firm wants to motivate its manager to be *more* aggressive and to increase output in order to decrease the output of rival firms. In contrast, when managers choose prices and, hence, choices are strategic complements, the firm wants its manager to be *less* aggressive and to increase the firm's price, which, in turn, leads rival firms to increase their prices. While the intensity of rivalry thus diminishes in the case of strategic complements, in the substitutes case,

⁵The literature may use different terms for what we call *firms*. Fershtman and Judd (1987) use the term *owners*, distinguishing them from *managers*. Agency theory usually uses the terms *principal* and *agent*. Finally, in the organizational literature, the entity that determines structure and incentives is usually described as the *head office*. We will use the more neutral word, *firm*, and have a body in mind that cares about firm profits and sets the organizational structure and the managerial incentives.

the strategic use of organizational design leads to a prisoner's dilemma; both firms' desire to commit to high output results in excessive aggressiveness and reduced firm and industry profits.

In their seminal paper, Fershtman and Judd (1987) explore the case in which managers' compensation is based on a weighted average of profits and sales. In stage 1, the firm determines the relative weight on profits and sales. Stage 2 is a Cournot quantity game. The authors show that firms, in equilibrium, provide a positive weight on sales, thus making managers behave more aggressively, i.e., sell more products at a lower price. A central notion in this stream of research, dating back to Schelling (1960), is that firms may gain from distorting their managers' incentives relative to profit maximization because of its effect on strategic interaction.

The effect of structure on managerial behavior has been studied mostly in the context of channel structure, rather than organizational structure (e.g., McGuire and Staelin 1983, Moorthy 1988, Bonanno and Vickers 1988). In the first stage, two firms choose whether to sell their products through retailers (separation) or market the products themselves (integration). In the case of separation, firms subsequently set a wholesale price. In the last stage, retailers compete in strategic substitutes or complements. Because of double marginalization, vertical separation effectively increases prices, decreases output, and, hence, softens competition. However, in the case of strategic substitutes, vertical integration generally dominates separation, because firms prefer to commit to being aggressive.

A potential shortcoming of the extant literature is that each paper studies compensation systems or organizational structure in isolation. Arguably, this may result in misleading conclusions, because firms typically make decisions about both their managerial remuneration system and their organizational structure. If the interaction between compensation systems and structure is nontrivial, the combination of these two organizational features may generate unexpected results.

Consider, for example, the electronics company, Philips. Between 1970 and 2000, this company went through seven large restructuring processes, changing from national organizations, via a matrix organization, to global product divisions. These

structural modifications were followed by changes in the responsibility and accountability of the organization and the implementation of different performance incentive systems. While many other examples are known of large organizations that have changed their organizational structure and compensation systems, such as IBM, Chrysler, and BP, organizational design involves choices about both structure and incentives in virtually all business organizations.

The questions that are addressed in this chapter are the following. How does the combination of organizational structure and compensation systems affect competition, and how does competition affect these two elements of organizational design? Does a multifaceted organizational design create the opportunity to avoid the prisoner's dilemma that occurs when either structure or remuneration systems are studied in isolation? Does the simultaneous endogeneity of structure and compensation systems lead to firm homogeneity, as suggested in previous research, or does it encourage firms to differentiate their organizational form, resulting in firm heterogeneity? In this chapter, we explore these specific questions while acknowledging that many other factors such as organizational complexity and bounded rationality—not modeled in this chapter—affect the optimal design of business organizations.

To further our understanding of the relationship between the inside and the outside of the organization, we develop a model in which both organizational structure and managerial compensation systems are endogenized. In the model, two firms first determine whether their organizational structure is vertically centralized or decentralized, i.e., whether the production and marketing departments are treated as a single profit center or as two distinct profit centers, having the autonomy to make operating decisions (Williamson, 1985). Subsequently, firms choose whether to use relative performance evaluation as a basis for their managerial remuneration system. Relative performance evaluation is a compensation scheme in which the performance of the manager is compared to an external benchmark by placing a—typically negative—weight on the rivals' profits (see, for example, Holmström, 1979, in an agency context, and Salas Fumás, 1992, and Miller and Pazgal, 2001, in a strategic incentives context). Some form of relative performance evaluation, or

competitor orientation, is used frequently as an objective in compensation schemes. For example, the use of external benchmarks in the case of executive compensation is well documented (Aggarwal and Samwick, 1999). The use of market share objectives is also considered a competitor-oriented compensation scheme, because it is a function not only of the sales of the own firm, but also of the sales of rival firms. Market share is one of the most commonly used objectives for sales organizations (see, e.g., Dalrymple and Cron, 1995; Kaplan, 1996). An example of a firm that has used competitor-oriented objectives for business unit managers is General Electric, which used the mantra “number 1 or number 2” for individual businesses.⁶ In the third stage of the model, the production and marketing departments negotiate the transfer price used to establish the performance of each profit center. This stage obviously only takes place if the decentralized structure is implemented. The last stage of the model is Cournot quantity competition. Thus, the model is a non-repeated multi-stage game with simultaneous moves.

We find that the interaction of organizational structure and compensation systems is nontrivial and may reverse previously found results. While centralization typically dominates decentralization in strategic delegation games, in the equilibrium of this model at least one firm is decentralized. If the production department has enough bargaining power for there to be sufficient double marginalization, this decentralization softens competition to such an extent that profits are higher, not lower, than Cournot profits. Moreover, otherwise identical firms may choose different organizational designs, leading to asymmetric subgame-perfect equilibria: one firm chooses to decentralize, and places a negative weight on rivals’ performance, while its centralized rival uses a positive weight. This endogenous firm heterogeneity is associated with a further diminished intensity of rivalry, approaching the maximum industry profits, despite the perfectly noncooperative setting. Thus, even though organizational structure and managerial reward systems may each, in isolation, have

⁶Another example of the use of competitor-oriented objectives for middle-level managers is the hotel industry, where sales managers of hotel establishments are typically rewarded based on the “Revenue per Available Room Index”, which is calculated in comparison with the other hotels in the same market (based on the Smith Travel Research STAR report).

a detrimental effect on firms' profits, the combination of these two elements of organizational design may actually increase profits.

A way to understand the underlying mechanism of this study is by examining the quasi-reaction curves of the managers when they compete in the final stage of the game. More specifically, one may explore how firms influence managerial behavior through the manipulation of managers' reaction curves. In the literature, many different degrees of control over reaction curves have been identified and studied. On the one hand, there is very limited, or no, control over the reaction curves in studies such as Fershtman and Judd (1987), Salas Fumás (1992), or standard Cournot. On the other hand, studies such as Fershtman, Judd, and Kalai (1991) and Miller and Pazgal (2001) investigate the characteristics of delegation games in which firms have far less restricted control over managers. Miller and Pazgal study games in which the firm can independently control the reaction function's slope and intercept. They show that any solution, e.g., the collusive outcome, to the demand system is an equilibrium of such a game. By allowing managers' actions to depend on both their own and on their rivals' compensation schemes, Fershtman, Judd, and Kalai also find an equilibrium that yields the collusive outcome.

This study is motivated by both streams of research. Organizational designs that are composed of two elements rather than a single one confer more control over managers' behavior. While choices of organizational structure and remuneration systems increase the level of control, they do not allow firms to independently set reaction curves, as will be explained in detail below. This study thus focuses on how different elements of organizational design may extend the control over management. At the same time, by distinguishing between organizational decisions taken centrally and decentrally, the study also highlights the limits of this control. For example, whereas the firm in this model determines organizational structure and compensation schemes, decisions about the transfer price and output quantity are taken decentrally and may or may not be in line with the firm's direct objectives. Moreover, the use of decentralization and transfer pricing creates an internal conflict, and, thus, inefficiencies from the firm's point of view. The strategic use of these

organizational inefficiencies lies at the heart of this study. The present study well complements another recent theoretical paper that examines the deliberate design of organizational inefficiencies (Balasubramanian and Bhardwaj, 2004). These authors conclude that “the firm’s resulting profits in this setting of [internal] conflict can be higher than those obtained when the decisions of the managers are perfectly coordinated” (p. 489).

This chapter is organized as follows. In Section 3.2, we introduce the model. Section 3.3 contains an analysis, a discussion, and some special cases of the model. The results are discussed in Section 3.4. The proofs of the propositions are included in the appendices.

3.2. Model

There are two firms, indexed $i = 1, 2$. The stages of the model are as follows. In stage 1, the firms simultaneously decide whether to centralize ($O_i = C$) or to decentralize ($O_i = D$). The outcome of this stage determines whether transfer pricing (stage 3) takes place. In stage 2, the firms determine the weight μ_i placed on relative performance in the marketing managers’ contracts. In stage 3, if the firm is decentralized, a transfer price w_i is determined through negotiations between the production and marketing managers. In stage 4, the marketing managers set the output quantity q_i . The market price P of the homogenous good is determined by the total output quantity $Q = q_1 + q_2$ and market demand. Inverse demand is given by $P = a - bQ$, $a > 0$, $b > 0$. The production costs of firm i are given by cq_i , where, for simplicity, $c = 0$. The stages of the model are depicted in Figure 3.1.

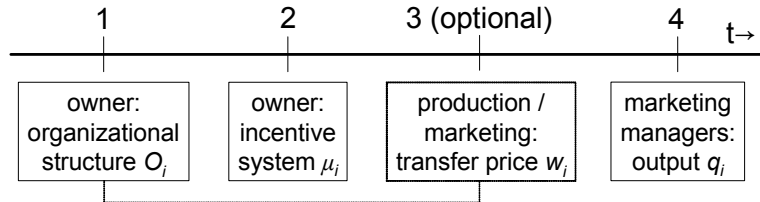


Figure 3.1. Stages of the model.

We provide some additional information and notation for each stage.

Stage 1. Decentralization is modeled as vertical separation in production and marketing departments, rather than horizontal separation in product divisions. This choice allows us to draw insights from and contribute to both the vertical integration/separation and the strategic incentives literatures. If the organizational structure is centralized, i.e., the production and marketing departments are combined and managed by the same manager, no transfer pricing takes place. The organizational structure thus affects the marginal costs as perceived by the manager who decides the market quantity. While the perceived marginal costs equal the transfer price in the case of decentralization, in the case of centralization the perceived and actual marginal costs do not differ.

Stage 2. Following Salas Fumás (1992), the incentive contract for the marketing managers of firm $i = 1, 2$ has the following form:⁷

$$I_i^M = \pi_i^M + \mu_i \pi_j.$$

Here, π_i^M are the profits of the focal marketing department, π_j ($j \neq i$) are the profits of the rival firm, and $\mu_i \in \Re$ is the weight put on the rival's profits.⁸ Departmental profits are defined as follows: $\pi_i^M = (P - w_i)q_i$ and $\pi_i^P = (w_i - c)q_i$ (thus, $\pi_i^M + \pi_i^P = \pi_i$). For simplicity, the production manager has a contract based on absolute performance, rather than relative performance (i.e., $I_i^P = \pi_i^P$).

A positive value for μ_i is expected to make marketing manager i less aggressive, i.e., set a smaller output quantity, because he or she is rewarded for an increase in the rival's profits. In the extreme case, if all firms in an industry could credibly commit

⁷Following Fershtman and Judd (1987), one could write a manager's reward scheme as $A_i^D + B_i^D I_i^D$ for some constants A_i^D , B_i^D , where $B_i^D > 0$ and the superscript D stands for the respective department ($P =$ production, $M =$ marketing). Since the manager is risk-neutral and efforts are not modeled in this paper, he or she maximizes I_i^D , regardless of the value of A_i^D and B_i^D .

⁸As a matter of definition, the unit of comparison for the performance of each marketing department could be either the rival firm as a whole, or the rival marketing department specifically. This choice does not affect the incentives of the manager, because marketing manager i maximizes $\pi_i^M + \mu_i^M \pi_j$, where π_j could be defined either as $q_j P - q_j c$ or $q_j P - q_j w_j$. Since q_j , c , and w_j are all treated as constants when marketing manager i solves the optimization problem, both expressions yield the same outcome. The outcome of the game is thus independent of this choice. In the present model, the marketing department's performance is compared to the performance of the rival firm as a whole, which facilitates the analysis of the model.

to setting $\mu_i = 1$, the collusive outcome, in which industry profits are maximized, would be attained. A negative value for μ_i obviously has the opposite effect, because the reward increases as the rival's profits decrease. Finally, $\mu_i = 0$ would lead to an incentive that is equal to absolute performance evaluation, putting no weight on the performance of other firms in the industry. While agency theory has provided a rationale for using relative performance evaluation to reduce the effect of common noise (e.g., Holmström, 1979), this study focuses on the effect of these schemes on the manager's behavior in competition, as proposed by Salas Fumás (1992). We explore relative performance evaluation with external benchmarks, whereas Faulí-Oller and Giralt (1995) study internal comparison between product divisions.

Stage 3. Because the production and marketing departments are at the same time autonomous and mutually dependent, transfer pricing is necessary to determine the profitability of each department and to achieve accountability. A widely used practice to determine transfer prices is through negotiation (Kaplan and Atkinson, 1998; Vaysman, 1998). While the bilateral bargaining game is not explicitly modeled, it is assumed that the production department receives a fraction $\alpha \in [0, 1]$ of the surplus, leaving a fraction $1 - \alpha$ for the marketing department (Van Mieghem, 1999).

The lower bound of the bargaining outcome is given by the minimum transfer price that is acceptable to the production department, which are the marginal costs of production. The maximum transfer price that is acceptable to the marketing department would in theory be the transfer price at which the marketing department would make zero profits. However, it is Pareto inefficient to increase the transfer price to a level higher than what would maximize the production department's profits. Consequently, the upper bound of the bargaining outcome is given by the transfer price that maximizes the production department's profits.

The transfer price of firm i is thus assumed to be

$$w_i = \alpha w_i^o + (1 - \alpha)c,$$

where α is an exogenously given parameter, which is equal for both firms, and w_i^o is the transfer price that maximizes the profits of production manager i . If both firms are decentralized, w_i^o is determined as the Nash equilibrium of the simultaneous move by the production managers. If only one firm is decentralized, w_i^o is determined as a the maximum of a single-player optimization problem. If a firm is centralized, this stage is omitted (i.e., the transfer price is equal to marginal costs).

The exogenous parameter α can be interpreted as the relative bargaining power of the production department *vis-à-vis* the marketing department (Van Mieghem 1999).⁹ If $\alpha = 1$, the production manager has all the bargaining power and sets a transfer price that will maximize the production department's profits. If $\alpha = 0$, all the bargaining power resides at the marketing department, which then pays a transfer price equal to marginal costs. Note that this latter case is equivalent to centralization. The bargaining parameter α could thus be interpreted as a continuous measure of the degree of decentralization.

Whereas Alles and Datar (1998) study transfer prices that are determined by the CEO, in our case transfer prices are thus set in a decentralized fashion. Kaplan and Atkinson (1998) acknowledge that decentrally-negotiated, linear transfer prices may lead to a suboptimal level of output from the firm's point of view. Dual-rate transfer prices (two-part tariffs) could solve this problem, but, according to Kaplan and Atkinson, are rarely used in practice. This study explores whether these internal inefficiencies could soften oligopolistic competition to the benefit of the focal firm.

Stage 4. Marketing manager i chooses output q_i to maximize $I_i^M = \pi_i^M + \mu_i \pi_j$.

The sequence of the modeling stages reflects the time horizon of the decisions that are made at each stage. In most cases, the choice of organizational structure represents a long-term decision, as costly to reverse as a major bricks and mortar investment. The design and implementation of a managerial compensation system represents a medium-term decision, which may be changed more often than the

⁹The relative bargaining power of the production and marketing departments could be seen as depending on the value added of each department in the value chain. Another, complementary, perspective is to assert that bargaining power depends on the *administrative heritage* of the company (Bartlett and Ghoshal, 1989). While, in some companies, production traditionally plays a more important role, in other companies marketing, historically, is more dominant.

organizational structure. Note that a change in the organizational structure generally necessitates a restructuring of compensation schemes, while the opposite is not true. Transfer prices are typically determined once a year, while output decisions are short-term decisions that are taken on a day-to-day basis.

The model used in this chapter is a game of complete information. We assume, for example, that incentive contracts can be observed by all the involved parties. Whether this is true empirically obviously depends on the specific situation. In studying strategic incentives in the gasoline industry, Slade (1993) argues that incentive contracts are observable, and could, therefore, be used as a strategic commitment device. Moreover, even if information is incomplete, our results may still hold. Katz (1991) studies a principal-agent model with unobservable contracts, and concludes that these contracts may have commitment value in spite of their unobservability.

3.3. Equilibrium Analysis

In this section, we first analyze the case in which organizational structure is endogenized but compensation systems are treated as exogenously given (Section 3.3.1). Then, we endogenize the compensation system for exogenously given organizational structures (Sections 3.3.2 - 3.3.6). Finally, we present and discuss the overall solution to our model, endogenizing both organizational structure and compensation systems (Section 3.3.7).

Separately analyzing the special cases of our model allows us to link the present model to the existing literature, to create a benchmark with which the solution of the overall model can be compared, and to provide intuition for the building blocks of the model. Moreover, in some specific real-life situations, special cases of our model may be more applicable than the overall model. As mentioned earlier, the choice of organizational structure represents a long-term decision, while the compensation system could be modified in the medium term. Whereas strategic consequences of organizational design are the focus of this study, many operational rather than strategic considerations may influence the choice of organizational form.

Thus, when evaluating different compensation schemes, senior management may take the existing organizational structure in certain circumstances as given.

3.3.1. Endogenization of Organizational Structure

Throughout this section, we assume that there is no relative performance evaluation, i.e., $\mu_i = 0$.¹⁰ Two firms choose whether to be centralized or to be decentralized, in which case the marketing department pays a negotiated transfer price to the production department. The outcome of this game could be that both firms are centralized (denoted $O_i O_j = \widehat{CC}$, where the superscript “ $\widehat{}$ ” signifies that $\mu_i = 0$), both are decentralized (denoted \widehat{DD}), or that one firm is decentralized, while the other is centralized (denoted \widehat{DC}). Equilibrium values are denoted throughout this chapter with the superscripts $O_i O_j$, where i represents the focal firm and j the rival firm.¹¹

The question we address here is as follows. How does the choice of organizational structure affect the market outcome, specifically in terms of firm profitability?

Proposition 3.1. *Suppose that there is no relative performance evaluation, i.e., $\mu_1 = \mu_2 = 0$.*

- (i) *Two decentralized firms have profits that are higher than those of two centralized firms, for $0 < \alpha \leq 1$.*
- (ii) *There is a unique value of $\alpha \in (0, 1)$, such that two decentralized firms attain the collusive outcome, absent explicit coordination.*
- (iii) *The subgame-perfect equilibrium of this case is that both firms are centralized (CC), eliminating the softening effect of decentralization.*

¹⁰This special case of our model can be seen as a reinterpretation of the study of vertical integration and separation by, among others, McGuire and Staelin (1983), Bonanno and Vickers (1988), and Moorthy (1988). Our case is different in that we consider vertical separation *within* a firm (called vertical *decentralization*), as opposed to vertical separation *between* firms.

¹¹For example, q^{CD} is the equilibrium output quantity of a centralized firm with a decentralized competitor. Further, \widehat{q}^{CD} is the equilibrium output quantity of a centralized firm competing with a decentralized firm, in the absence of relative performance evaluation.

It is well-known that vertical separation creates a negative externality (*double marginalization*) that reduces output. The positive effect on price is confirmed in a number of empirical studies (discussed in Lafontaine and Slade, 1997). This effect also holds in our situation of vertical decentralization within a firm. We now discuss the possible cases (\widehat{CC} , \widehat{DD} , and \widehat{DC}) in turn.

If both firms are centralized, transfer pricing does not take place, the value of α is not relevant, and the standard Cournot outcome obtains for all α . If both firms are decentralized and $\alpha = 0$ (i.e., the sales manager has all the bargaining power), the transfer price is equal to marginal costs and, therefore, decentralization does not affect the incentives of the sales manager. Consequently, similar to the \widehat{CC} case, the standard Cournot outcome obtains. However, as α gets larger (i.e., the bargaining power of the production manager, relative to the marketing manager, increases), the transfer price becomes larger, which inflates the marginal costs as perceived by the marketing manager, and output decreases. Since the industry output in the standard Cournot context is larger than the monopoly output, the output reduction caused by decentralization has a positive effect on industry and firm profitability. In fact, there exists a value for α (denoted by $\widehat{\alpha}$), such that, when both firms are decentralized and $\alpha = \widehat{\alpha}$, industry profitability is maximized (each firm obtains half of the monopoly profits). For $\widehat{\alpha} < \alpha \leq 1$, the reduction effect is so large that the industry output is *less* than the perfectly collusive output, and profitability declines (remaining, nevertheless, larger than standard Cournot).

If one firm is decentralized, while the other is centralized, the centralized firm obtains profits that are higher than those of the decentralized firm; the decentralized firm's output reduction benefits the centralized firm, while hurting the decentralized firm. As α increases, the difference between the centralized and decentralized firms' profits increases.

Solving the special case that $\mu_i = 0$ by backwards induction shows that each firm wants to centralize, independent of the structure of the rival (indeed, $\widehat{\pi}^{CD} > \widehat{\pi}^{DD}$ and $\widehat{\pi}^{CC} > \widehat{\pi}^{DC}$ for $0 < \alpha \leq 1$). Centralization is thus the dominant strategy, and \widehat{CC} is the subgame-perfect equilibrium. The general conclusion of the strategic incentives

literature—increased aggressiveness in the case of strategic substitutes—thus holds in this special case of our model. We find that firms choose to be centralized, although decentralization could increase profits up to the level of perfect collusion. The intuition behind this result is that firms want to commit to aggressive behavior knowing that this will soften the rival’s behavior, given the substitutes nature of competition. However, since both firms simultaneously decide to centralize, industry and firm profits decline relative to the decentralization case. This is an example of the well-known prisoner’s dilemma. In the absence of explicit collusive agreements, firms cannot avoid a mutually detrimental outcome.

3.3.2. Endogenization of Compensation Systems: *CC*-subgame

We now endogenize compensation systems, while treating the organizational structure as given. In this section, we discuss the situation in which both firms are centralized. This section thus considers a subgame of the overall model (referred to as the *CC*-subgame). Section 3.3 deals with the case that both firms are decentralized (the *DD*-subgame). The case in which one firm is decentralized while the other is centralized (the *DC*-subgame) is discussed in Section 3.4. Hence, the question addressed in this section is as follows. How does the use of relative performance evaluation affect the market outcome?

Proposition 3.2. *Suppose that both firms are centralized.*

- (i) *In the continuum of solutions that are subgame-perfect equilibria, the incentive parameter used satisfies the following expression:*

$$\mu_1 = -\frac{1 + \mu_2}{1 - 3\mu_2}, \text{ with } \mu_i < \frac{1}{3}.$$

- (ii) *The use of relative performance evaluation increases industry output and decreases industry profits, relative to the standard Cournot outcome.*

The model in this section is equivalent to the special case of the model in Salas Fumás (1992) where managers are assumed to be risk neutral. An effective way

to understand the intuition of this result is by examining a graph in which the managers' (quasi-)reaction curves and the firms' isoprofit curves are depicted (Figure 3.2). In the figure, the standard Cournot outcome (point C) is compared to the outcome that obtains when firms can use relative performance evaluation for their managers (point S).

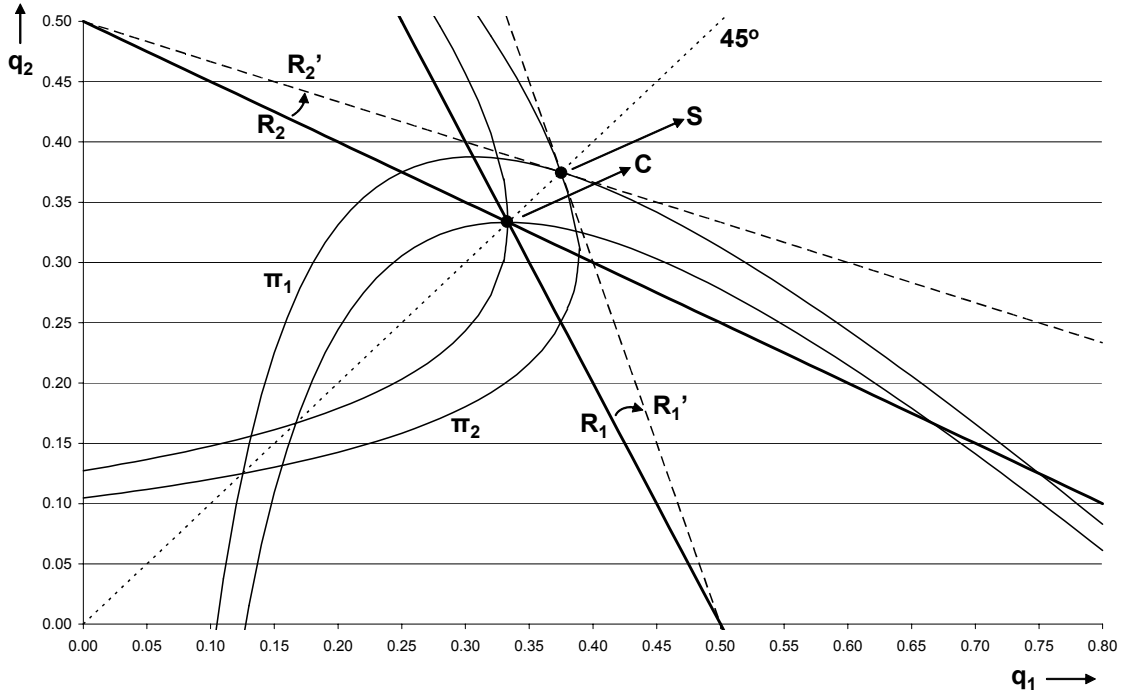


Figure 3.2. Relative performance evaluation increases equilibrium output.

R_1 and R_2 are the standard, downward-sloping Cournot reaction curves. The use of relative performance evaluation rotates the manager's reaction curve around the intersection with the firm's own quantity axis. The use of relative performance evaluation with $\mu_i < 0$ makes the managers' reaction less sensitive to changes in the rival's output (i.e., R'_1 is steeper than R_1 and R'_2 is flatter than R_2). The reason for this is that as q_j increases firm j becomes more vulnerable to firm i 's actions, providing the incentive to firm i 's manager to increase output, which partially offsets the standard negative relationship between q_i and q_j in Cournot competition. The managers' reaction curves are given by the following expression:

$$R_i : q_i(q_j; \mu_i, \alpha) = \frac{a}{2b} - \frac{1}{2}(1 + \mu_i)q_j.$$

Note in Figure 3.2 that in point S firm i has rotated R_i in such a way that, at the intersection of R'_i and R'_j , R'_j is tangent to firm i 's isoprofit curve, which ensures that the profits of firm i are maximized, given R'_j .¹² In the unique symmetric solution to the CC -subgame (point S), $\mu_1 = \mu_2 = -\frac{1}{3}$ and the equilibrium output is larger than in Cournot. This result confirms the conventional wisdom that firms that are competing in strategic substitutes have the incentive to make their managers more aggressive.

As pointed out by Salas Fumás (1992), apart from the symmetric equilibrium depicted in Figure 3.2, there are also asymmetric equilibria in which $(\mu_i, \mu_j) = (-1, 0)$. In this case, R_j and R'_j coincide, while R_i is zero sloped with regards to its own axis, because the positive relative performance effect exactly offsets the standard negative Cournot effect, given that the sum of the weights on π_i and π_j equals zero ($I_i^M = \pi_i - \pi_j$). As $\mu_i < -1$, R_i becomes upward sloping: the relative performance effect dominates the standard Cournot effect. Thus, the use of relative performance evaluation makes it possible that the game changes from competition in strategic substitutes to competition in strategic complements.

Salas Fumás (1992) shows that $(\mu_i, \mu_j) = (-1, 0)$ yields the Stackelberg outcome with firm i being the leader. The total industry output Q and profits Π are the same in the described symmetric and asymmetric solutions: $Q = \frac{3a}{4b}$, $\Pi = \frac{3a^2}{16b}$. In Appendix B, we show that there is in fact a continuum of solutions, as stated in Proposition 3.2., in which $Q = \frac{3a}{4b}$.

In summary, while relative performance evaluation (at least in theory) creates the potential for firms to collude through *positively* weighing the rival's profits in the manager's objective function, in equilibrium at least one of the firms provides a *negative* weight on the profits of the rival firm. Relative to standard Cournot without relative performance evaluation, industry output increases and industry profits decrease. Hence, equivalent to the case discussed in Section 3.3.1, endogenizing

¹²The profits of Firm 1 (2) increase in the southeast (northwest) direction. The isoprofit curves are zero sloped with regards to their *own* axis when they intersect the Cournot reaction curve: since reaction curves depict the optimal value of q_i given q_j , a change in q_i without changing q_j lowers π_i .

compensation systems leads to a prisoner's dilemma, decreasing each firm's profits.

3.3.3. Continuum of Solutions in Salas Fumás

Salas Fumás (1992) mentions the unique symmetric equilibrium and two asymmetric equilibria. (These asymmetric equilibria are characterized by $\mu_i = 0$ and $\mu_j = -1$, resulting in $q_i = \frac{a}{4b}$ and $q_j = \frac{a}{2b}$). However, it turns out that there is a continuum of asymmetric solutions. Each point on the line $q_1 + q_2 = \frac{3a}{4b}$ is an equilibrium (positive q_i imposes $\mu_i < \frac{1}{3}$). In the figure below, one can verify that for each point on the line $q_1 + q_2 = \frac{3a}{4b}$ the isoprofit curve Π_i is tangent to the reaction curve R_j (for $i \neq j = 1, 2$), which is the condition for the existence of an equilibrium.

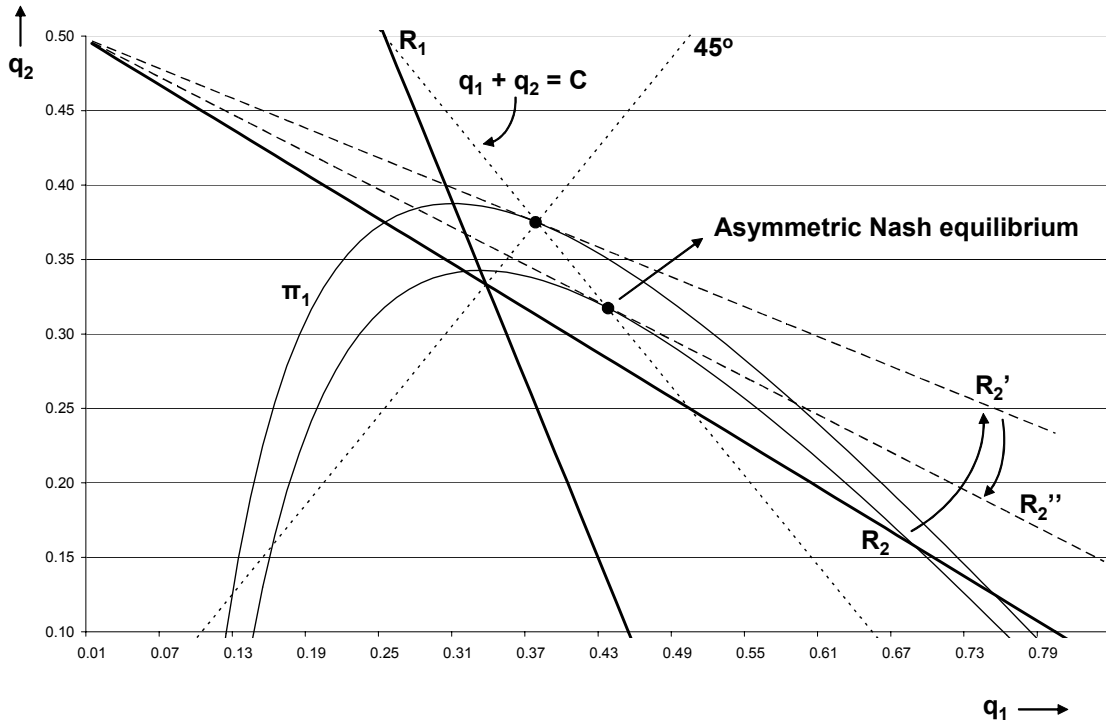


Figure 3.3 Continuum of solutions in Salas Fumás set up.

3.3.4. Comparing Salas Fumás with Fershtman and Judd

The Cournot-Nash equilibrium in the Fershtman and Judd (1987) setting is more aggressive than the one in the Salas Fumás setting. The equilibrium quantity in Fershtman and Judd is $q_i^{FJ} = \frac{2a}{5b}$ (Fershtman and Judd, 1987, p. 932), while the equilibrium in Salas Fumás equals $q_i^{SF} = \frac{3a}{8b}$ (see Appendix B). Geometrically, one

can easily verify why $q_i^{SF} < q_i^{FJ}$. Note, for example, that the rotation due to relative performance evaluation makes R_2^{SF} flatter than R_2^{FJ} . In equilibrium, R_j must be tangent to the isoprofit curve of Firm i . Note also that the slope of Firm 1's isoprofit curve decreases as one moves down the 45° line toward the Cournot equilibrium (at which point the slope equals 0). Thus, the fact that R_2^{SF} is flatter than R_2^{FJ} results in a simultaneous move Cournot-Nash equilibrium which is closer to point C. In Figure 3.4, the two equilibrium are compared.

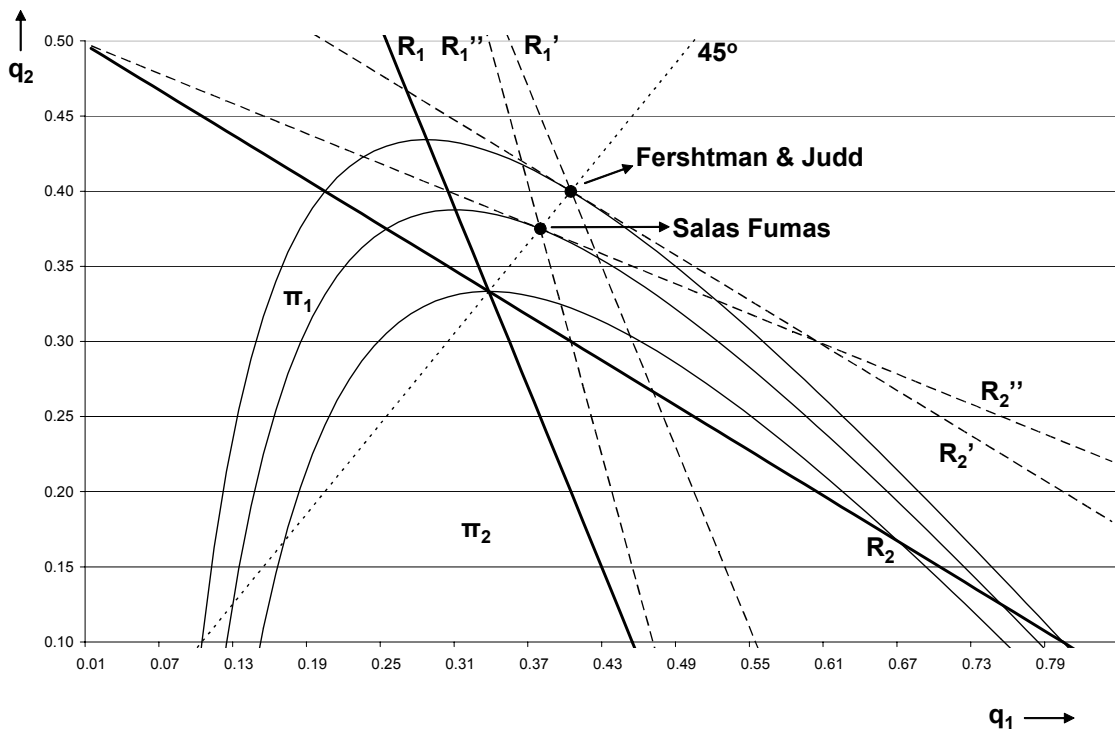


Figure 3.4 Fershtman & Judd versus Salas Fumás.

The economic interpretation of the ordering of q_i^{SF} and q_i^{FJ} is as follows. Note first that one must distinguish between a *level* and a *slope* effect of incentive schemes. Both Fershtman and Judd's and Salas Fumás' incentive schemes increase the *level* of aggressiveness. However, while the Fershtman & Judd incentive scheme does not affect the slope of the reaction curve, Salas Fumás' incentive scheme does. Specifically, R_1 becomes steeper and R_2 becomes flatter under Salas Fumás. The slope of the reaction curve could be interpreted as the manager's sensitivity to the competitor's action. This means that, while the Salas Fumás incentive scheme makes

the managers more aggressive on average (level effect), the managers become less sensitive to their competitor's move (slope effect). The diminished sensitivity is the result of two opposing effects of the competitor's action. The first is the standard strategic substitutes effect: as the action of the competitor increases, the optimal action of the focal firm decreases. However, this effect is partially offset by the introduction of relative performance evaluation. The manager gets rewarded not only for increasing its own profits, but also for decreasing the rival's profits. As the competitor increases its output, it pays off more to hurt the competitor by increasing one's own output quantity. (In other words, the increase of the competitor's output makes the competitor more vulnerable to the focal firm's actions). This second effect offsets part of the first effect, which makes the managers less sensitive to their rival's actions. The smaller sensitivity in the case of relative performance evaluation explains why $q_i^{SF} < q_i^{FJ}$.

3.3.5. Endogenization of Compensation Systems: *DD*-subgame

While decentralization makes firms behave less aggressively, decreasing output, relative performance evaluation (with $\mu_i < 0$) has the opposite effect: it encourages managers to behave more aggressively, increasing output. In this section, we analyze the net effect of these two opposite forces. Is the effect of decentralization stronger, reducing output, or does the belligerent effect of relative performance evaluation prevail over decentralization, increasing output?

Proposition 3.3. *Suppose that both firms are decentralized. The unique symmetric subgame-perfect equilibrium is characterized as follows:*

- (i) *If $\alpha = 0$, the equilibrium is equal to the equilibrium of the *CC*-subgame.*
- (ii) *As α increases from 0 to 1, μ^{DD} decreases monotonically from $-\frac{1}{3}$ to -1.53 , w^{DD} increases monotonically from 0 to $0.56a$, q^{DD} decreases monotonically from $3a/8b$ to $0.30a/b$, and π^{DD} increases monotonically from $3a^2/32b$ to $0.120a^2/b$.*

- (iii) *There exists an $\alpha^o \in [0, 1]$ such that if and only if $\alpha > \alpha^o$, firm profits exceed the profits in standard Cournot ($\pi^{DD} > \pi^{Cournot}$).*

The stages of the DD -subgame, discussed in this section, are as follows. First, the owners simultaneously set the incentive contracts I_i^M for the marketing managers by choosing μ_i . Subsequently, the production and marketing managers bargain over the transfer price $w_i \geq 0$. Finally, the marketing managers determine the output quantity that is put on the market $q_i \geq 0$.¹³

We explore the intuition of this subgame in a similar graph as above. For simplicity, we focus on firm 1's profits and firm 2's reaction curves. The reaction curves at the last stage of the game are as follows:

$$R_i : q_i(q_j; w_i, \mu_i, \alpha) = \frac{a - w_i}{2b} - \frac{1}{2}(1 + \mu_i)q_j.$$

While the incentive parameter μ_i rotates the reaction curves as before, the transfer price shifts the intercept. In Figure 3.5 below, point S is the symmetric equilibrium when two firms compete using relative performance evaluation but no decentralization (CC -subgame). The points D , C , and E are equilibria in the DD -subgame for different values of α .

¹³For a specific range of α , apart from the unique symmetric solution, there are also asymmetric solutions. Even if these solutions form an equilibrium in the DD -subgame, they do not constitute a subgame-perfect equilibrium of the overall game. The (symmetric and asymmetric) solutions to the DD -subgame are provided in Appendix B Section 3. The determination of the subgame-perfect equilibrium of the overall game is discussed in Appendix B Section 5.

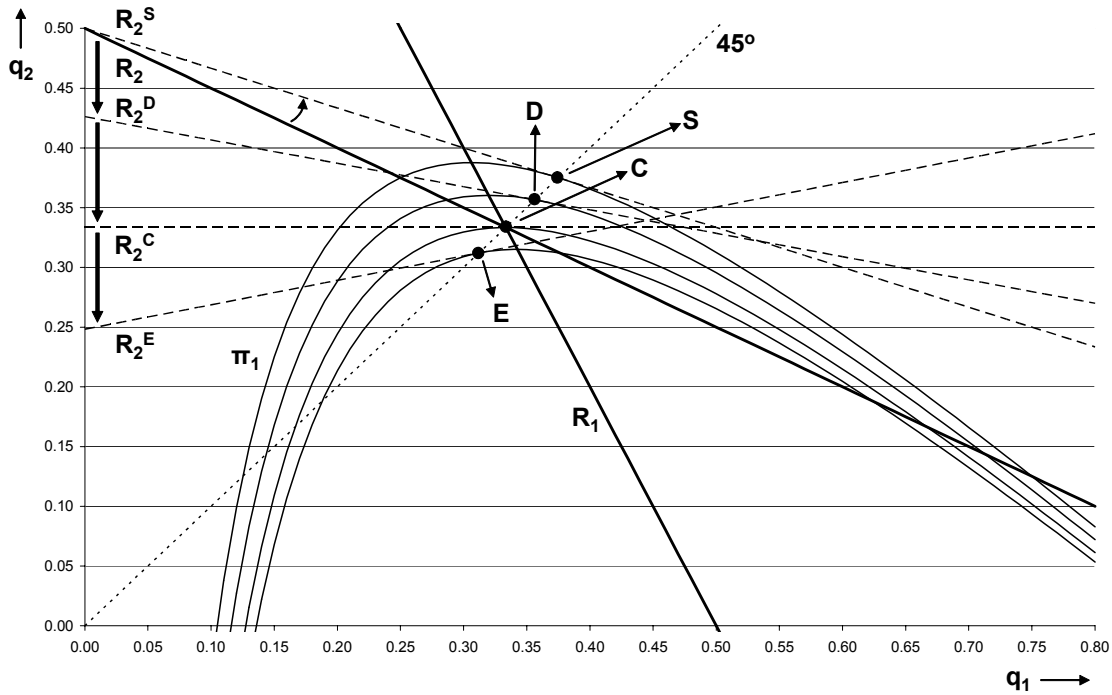


Figure 3.5 DD-subgame equilibria for different values of α .

If $\alpha = 0$, the transfer price is equal to marginal costs and decentralization does not affect the incentives of the manager. Therefore, the equilibrium is equal to the equilibrium of the *CC*-subgame (point *S*). For larger values of α , the impact of transfer pricing increases, and the intercept of the reaction curve moves to the origin.

How does the optimal value for the incentive parameter change as α increases? Given the negative slope of R_1 , if μ_2 would not change, the equilibrium would shift in the southeast direction (i.e., q_1 increases and q_2 decreases). This would obviously lower firm 2's profits. By further decreasing μ_2 , firm 2 is able to shift the outcome back in the northwest direction, increasing its profits. However, since the decrease in μ_2 has decreased the slope of R_2 , the equilibrium will fall at point *D*, rather than at point *S*.¹⁴ Thus, the decrease in μ_2 only offsets part of the output reducing effect of decentralization and transfer pricing. Compared to the case in which both firms

¹⁴In equilibrium, the slope of R_2 must be equal to the slope of firm 1's isoprofit curve. Decreasing μ_2 changes the slope of R_2 toward zero as explained above. The slope of the isoprofit curve is given by: $\frac{\partial q_2}{\partial q_1} |_{\pi_1=C} = \frac{1-q_2-2q_1}{q_1}$, which changes toward zero if one moves over the 45° line in the direction of point *C*. (Note that in the Cournot Nash equilibrium the slope of each firm's isoprofit curve is zero).

are centralized (CC -subgame), decentralization (DD -subgame) increases profits.

For larger values of α , the softening effect of decentralization further increases. We denote α^o the value of α for which $\pi^{DD}(\alpha)$ equals the Cournot profits. If $\alpha = \alpha^o$, the total effects of decentralization and relative performance evaluation exactly balance each other out. The equilibrium obtained is the Cournot outcome (point C), $\mu_i = -1$, and the slopes of the reaction curves are zero. For values of α larger than α^o , the softening effect of decentralization outweighs the aggressive effect of relative performance evaluation and profits are larger than the profits that are attained in standard Cournot ($\pi^{DD} > \pi^{Cournot}$).

In summary, $\pi^{DD}(\alpha)$ increases monotonically in α , with $\pi^{DD}(0) = \pi^{CC}$, $\pi^{DD}(\alpha) < \pi^{Cournot}$ for $0 < \alpha < \alpha^o$ and $\pi^{DD}(\alpha) > \pi^{Cournot}$ for $\alpha > \alpha^o$.

3.3.6. Endogenization of Compensation Systems: DC -subgame

In Sections 3.2 and 3.3, we have discussed the cases where the firms are either both centralized or decentralized. The case where one firm is decentralized (firm 1), while the other is centralized (firm 2), is analyzed in this section. The questions we address here are as follows. What compensation systems are adopted by the centralized and decentralized firms? What is the market outcome?

Proposition 3.4. *Suppose that one firm is centralized, while the other is decentralized. The unique subgame-perfect equilibrium is characterized as follows.*

- (i) *The centralized firm uses a compensation system that makes the manager behave less aggressively ($\mu^{CD} > 0$). The decentralized firm uses a compensation system that makes the manager behave more aggressively ($\mu^{DC} < 0$).*
- (ii) *Industry profits are maximized, i.e., total profits equal the monopoly profits ($\pi^{DC} + \pi^{CD} = \pi^M$).*
- (iii) *The decentralized firm's profits weakly exceed those of the centralized firm ($\pi^{DC} \geq \pi^{CD}$ for $0 < \alpha \leq 1$ with the equality holding if and only if $\alpha = 1$).*

The stages of this subgame are as follows. First, both firms determine the incentive contract I_i^M for the marketing managers by choosing μ_i . Second, firm 1's production and marketing managers bargain over the transfer price w_1 , while there is no transfer pricing in firm 2 (equivalently, one can state $w_2 = c$). Finally, the marketing managers determine the output quantity.

Solving this subgame by backward induction yields the following expressions for optimal output quantities in the last stage:

$$\begin{aligned} q^{DC} &= \frac{a - 2w_1 - \mu_1}{b(3 - \mu_1 - \mu_2 - \mu_1\mu_2)}, \\ q^{CD} &= \frac{a + w_1 - a\mu_2 + \mu_2w_1}{b(3 - \mu_1 - \mu_2 - \mu_1\mu_2)}. \end{aligned}$$

Since only one firm is decentralized, the second stage involves a one-firm optimization problem, rather than a two-firm Nash equilibrium. The negotiated value of the decentralized firm's transfer price is given by: $w^{DC} = \alpha \frac{a}{4}(1 - \mu_1)$. Substituting q^{DC} , q^{CD} , and w^{DC} in the profit functions and solving the first order conditions simultaneously yields the following expressions of the optimal incentive parameters:

$$\mu^{CD} = 1; \mu^{DC} = -\frac{4 - \alpha}{\alpha}.$$

Substituting these values in the above expressions yields:

$$\begin{aligned} w^{DC} &= a, \\ q^{DC} &= \frac{a}{4b}(2 - \alpha), \\ q^{CD} &= \frac{a}{4b}\alpha. \end{aligned}$$

Thus, the total industry output and the market price for $0 < \alpha \leq 1$, is given by $Q^{DC} = \frac{a}{2b} = Q^M$ and $P^{DC} = \frac{1}{2}a = P^M$, where the superscript M denotes the monopoly outcome. If one firm is centralized and the other decentralized, in equilibrium and independent of the division of bargaining power, the industry attains the collusive or monopoly outcome. Thus, in an environment that is perfectly non-

cooperative and that is expected to make firms aggressive, tacit collusion occurs and industry profits are maximized.

The firms' equilibrium profits are given by $\pi^{DC} = \frac{a^2}{8b}(2 - \alpha)$ and $\pi^{CD} = \frac{a^2}{8b}\alpha$. The division of the industry profits between the two firms thus depends on the parameter α . If $\alpha = 1$, i.e., if the production manager has all the bargaining power, profits are split evenly between the two firms: $\pi^{DC} = \pi^{CD} = \frac{a^2}{4b}$. As α decreases, the decentralized firm can set a more aggressive incentive structure and still compel the centralized firm to behave in a collusive fashion: $\pi^{DC} > \pi^{CD}$.

The equilibrium of the *DC*-subgame is surprising. While prior research shows that firms competing in strategic substitutes typically provide aggressive incentives to their managers, we find that the centralized firm sets $\mu^{CD} = 1$, which implies that the manager of firm 2 is incentivized to maximize *industry* profits, rather than *firm* profits. This compensation scheme rotates the manager's reaction curve inward, as shown in Figure 3.6. In contrast, the decentralized firm provides a highly aggressive compensation scheme with $\mu_1 < -1$, which means that R_1 is upward sloping. In the figure, two equilibria are shown. Point *M* represents the equilibrium for $\alpha = 1$, while point *N* depicts the equilibrium for $0 < \alpha < 1$. In both points *M* and *N*, the perfectly collusive outcome is obtained. In point *M*, the collusive profits are shared evenly, whereas the decentralized firm obtains more profits than the centralized firm in point *N*.

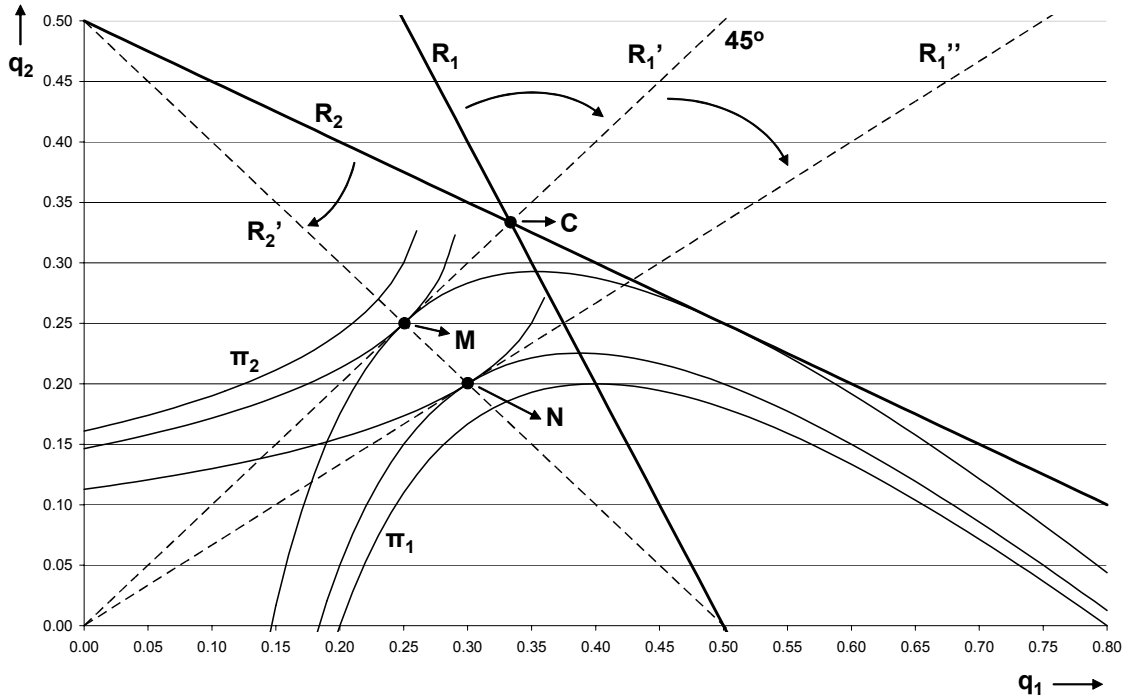


Figure 3.6 DC-subgame for different values of α .

As can be seen from the figure, for different values of α R_1' rotates around the origin, while R_2' does not depend on α . While the particular form of these reaction curves may seem surprising, they are the logical consequence of simple assumptions, such as decentralization, transfer pricing, and relative performance evaluation. To understand the intuition, we discuss the ability of the firms to control the managers' reaction curves. It will turn out that while firms in this model have more degrees of freedom than in most previous research (i.e., organizational structure and compensation schemes), there are still significant limitations to the level of control firms have over their managers, which plays an important role in the determination of the outcome.

When the firms determine the compensation schemes, i.e., μ_1 and μ_2 , they foresee the effect on transfer pricing and, ultimately, output decisions. Substituting the equilibrium value of the decentralized firm's transfer price ($w^{DC} = \alpha \frac{a}{4}(1 - \mu_1)$) into

the reaction curves yields the following expressions:

$$\begin{aligned} R_1 & : q_1(q_2; \mu_1, \alpha) = \frac{a}{2b} - \alpha(1 - \mu_1)\frac{a}{8b} - \frac{1}{2}(1 + \mu_1)q_2, \\ R_2 & : q_2(q_1; \mu_2, \alpha) = \frac{a}{2b} - \frac{1}{2}(1 + \mu_2)q_1. \end{aligned}$$

The effect of μ_1 and μ_2 on the slope of the reaction curves is as before. Note that a negative value of μ_1 decreases the intercept of R_1 . Decreasing μ_1 will, *ceteris paribus*, shift market share from the centralized to the decentralized firm, which will induce the production manager to increase the transfer price, which in turn decreases the intercept. Changes in μ_1 thus affect both the intercept and the slope of R_1 , while the centralized firm can only manipulate the slope of R_2 .

It is clear from Figure 3.6 that the centralized firm cannot increase its profits by changing μ_2 , given R'_1 . A change in μ_2 would rotate R_2 , which would shift the equilibrium to a lower isoprofit curve. From the figure, it seems that the decentralized firm would be able to profitably change μ_1 . However, it turns out that, for given α between 0 and 1, the effect of a change in μ_1 on the intercept would exactly offset the effect on the slope, evaluated at the intersection with R_2 . For example, if $\alpha = 1$ and $q_2 = \frac{a}{4b}$, $q_1(q_2; \mu_1, \alpha) = \frac{a}{4b}$ (point M) independently from μ_1 . The same holds for any other value of $0 < \alpha < 1$ (e.g., point N). In other words, given the specific effect of μ_1 on both the intercept and the slope of R_1 , the decentralized firm is indifferent in its choice of μ_1 . However, in order to preclude the centralized firm from defecting, only one value of μ_1 is possible in equilibrium (i.e., $\mu^{DC} = -\frac{4-\alpha}{\alpha}$).

The equilibrium value of the decentralized firm's transfer price is given by $w^{DC} = a$ for $0 < \alpha \leq 1$, where the demand parameter a equals the market choke price. It seems unlikely that a transfer price that is as high as the choke price allows for positive output by firm 1. However, the market price could be lower than the transfer price without forcing firm 1 to shut down, because the incentive of the marketing manager could be negative, i.e., $I_i^M \in \mathfrak{R}$. The participation constraint of the marketing manager requires that $A_i^M + B_i^M I_i^M$ be larger than, or equal to, the reservation value of the manager, but does not impose restrictions on I_i^M . Moreover,

the use of relative performance evaluation makes firm 1's marketing manager care not only about the profits of firm 1, but also about the profits of firm 2. In particular, since $\mu^{DC} < 0$ for $0 < \alpha \leq 1$, shutting down would benefit the rival firm, and therefore diminish the compensation of the marketing manager of firm 1.

In Sections 3.3.2 - 3.3.6, we have discussed the three distinct subgames of the overall model. In the next section, the subgame-perfect equilibrium of the overall game, i.e., endogenizing both compensation systems and organizational structure, is discussed.

3.3.7. Solution of the Overall Model

In the first stage of the overall model, the firms simultaneously determine the organizational structure, before the compensation schemes, transfer prices, and output quantities are established. Given the optimal actions in the latter stages, one can describe the first stage choices in a 2 x 2 matrix, containing the four subgames (CC , DD , DC , and CD). The Nash equilibrium of this game constitutes the subgame-perfect equilibrium of the overall game. The payoffs are summarized in the following table.

	Centralization	Decentralization
Centralization	(π^{CC}, π^{CC})	(π^{CD}, π^{DC})
Decentralization	(π^{DC}, π^{CD})	(π^{DD}, π^{DD})

Table 3.1 Stage 1 firm payoffs.

The questions we address are as follows. If two competing firms simultaneously establish first their organizational structure and second their compensation systems, what structures and systems do they use? How does their choice affect the market outcome?¹⁵

¹⁵For ease of exposition, we restrict the characterization of the subgame-perfect equilibrium to symmetric strategies on the *off-equilibrium* path in the DD - and CC -subgames, without imposing symmetry restrictions on the equilibrium subgame itself. The full, unrestricted characterization of the equilibrium is included in Appendix B Section 5.

Proposition 3.5. *There exist a pair of values (α^o, α^*) satisfying the property that $0 < \alpha^o < \alpha^* < 1$, such that the subgame-perfect equilibrium outcome of the game in which both organizational structure and compensation systems are endogenized is characterized as follows.*

Equilibrium outcome:

- (i) *If $0 < \alpha < \alpha^*$, both firms are decentralized and use a negative incentive parameter ($\mu^{DD} < 0$).*
- (ii) *If $\alpha^* < \alpha \leq 1$, one firm is decentralized and uses a negative incentive parameter ($\mu^{DC} < 0$), while the other firm is centralized and uses a positive incentive parameter ($\mu^{CD} > 0$).*

Equilibrium profits:

- (iii) *If $0 < \alpha \leq \alpha^o$, both firms attain profits lower than, or equal to, standard Cournot ($\pi_i^* \leq \pi^{Cournot}$).*
- (iv) *If $\alpha^o < \alpha \leq 1$, both firms attain profits higher than standard Cournot ($\pi_i^* > \pi^{Cournot}$).*

We determine for each subgame whether it comprises a subgame-perfect equilibrium of the overall game. The CC -subgame does not constitute a subgame-perfect equilibrium, because at least one firm in the CC -subgame would want to defect to the DC -subgame, i.e., choose decentralization rather than centralization, because $\pi^{DC} > \pi^{CC} \forall \alpha$.

The DD -subgame has a unique symmetric equilibrium and may have up to four asymmetric solutions (i.e., $\mu_1 \neq \mu_2$), depending on α (see Appendix B). The asymmetric solutions can never constitute a subgame-perfect equilibrium of the overall model, because, for $0 < \alpha \leq 1$, the less aggressive firm (which has profits smaller than the more aggressive firm) could always increase its profits by defecting to the DC -subgame ($\pi^{CD} > \pi_L^{DD}$).

We define α^* as the value of α for which the profits of the centralized firm in the DC -subgame equal those of the symmetric DD solution, i.e., $\pi^{CD}(\alpha^*) = \pi^{DD}(\alpha^*)$. For $0 < \alpha \leq \alpha^*$, the symmetric solution to the DD -subgame constitutes a subgame-perfect equilibrium of the overall model, because then $\pi^{DD} \geq \pi^{CD}$. For $\alpha^* \leq \alpha \leq 1$, the DC - and CD -subgames are subgame-perfect equilibria ($\pi^{CD} \geq \pi^{DD}$).

The following figure shows how the profits of both firms in the equilibrium of the overall model vary with parameter α .

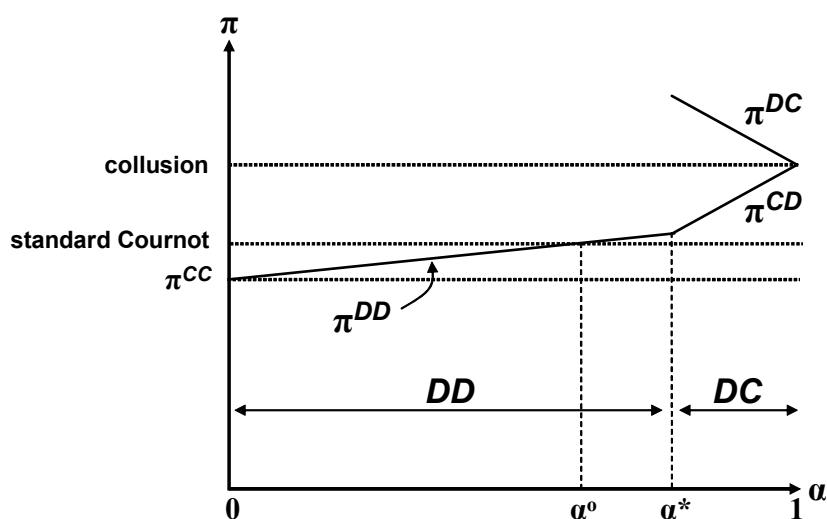


Figure 3.7 Equilibrium profits of the overall model.

Propositions 3.1 - 3.2 suggest that profits decrease if firms use a single element of organizational design as a strategic commitment device. This is consistent with previous research that consistently finds that, in the case of competition in strategic substitutes, endogenizing organizational structure or compensation systems in isolation increases firm aggressiveness and decreases profits. In contrast, we show that endogenizing both organizational structure and compensation systems softens competition and increases firm profits for $\alpha^o < \alpha \leq 1$. In the situation discussed in this study, the ubiquitous prisoner's dilemma of strategic incentives is solved. Moreover, if the effect of decentralization is sufficiently important, otherwise identical firms choose different organizational structures and compensation schemes, i.e., endogenous firm heterogeneity arises.

3.4. Discussion and Conclusion

The internal organization of a firm and the compensation schemes used for its management affect the incentives that guide managers' decisionmaking. While previous research has focused largely on internally-oriented decisionmaking, this chapter explores the effect of organizational design on decisions that directly influence product-market competition. In this study, we aim to elucidate how internal characteristics of firms, i.e., their organizational structure and compensation systems, affect the interaction between firms.

One of the main conclusions of the strategic incentives literature is that the strategic use of organizational design makes firms overly aggressive if they compete in strategic substitutes. This finding is based on the notion that organizational design is used as a commitment device, permitting the firm to benefit from its rivals' reactions. One problem with these studies, however, is that organizational features are studied in isolation, i.e., neglecting a possible interaction between them. This is potentially misleading because firms typically face multiple, possibly interdependent, decisions about their organizational design, such as the organizational structure and reward systems.

In our model, organizational structure and compensation schemes are studied simultaneously. Firms choose whether they operate in a centralized or in a vertically decentralized form, i.e., delegating operational decisions to production and marketing departments. Moreover, firms decide whether to use absolute or relative performance evaluation. In this setting, we show that the interaction between organizational structure and compensation systems is nontrivial. Indeed, we find that simultaneous determination of organizational structure and compensation systems may enable firms to tacitly collude and achieve the perfectly collusive outcome, despite the noncooperative setting.

Firm heterogeneity is an important phenomenon in the strategy literature and, to some extent, in the economics literature. For example, Hermalin (1994) aims to find an answer to the question, "why otherwise identical firms choose different incentives for their managers" (p. 518). One of our findings is that identical firms,

for certain parameter values, choose to be different. If the bargaining power of the production department, in determining the transfer price that the marketing department pays, is large enough, in equilibrium, one firm is centralized, while the other is decentralized. Moreover, the centralized firm uses an incentive scheme that encourages cooperation between the firms, while the decentralized firm encourages its manager to compete fiercely.

It is interesting to note that the effect of the organizational structure, in the asymmetric equilibrium, is opposite to that of the incentive schemes. Decentralization, because of double marginalization, makes firms less aggressive, which is counteracted by the aggressive incentive scheme with which the manager is provided. Similarly, the firm with the more aggressive centralized structure has a softening compensation arrangement. Indeed, in the extreme case where the production department has all the bargaining power, these effects cancel each other out, leading to equal division of the collusive profits.

Another noteworthy facet of our model is that firm heterogeneity and performance are positively associated: both firms' profits are larger if the firms are structured differently than if they are similar in terms of organization and compensation systems. The decreasing effect of various forms of differentiation on competition has previously been established, for example product differentiation (Hotelling, 1929), strategic dissimilarity (Gimeno and Woo, 1996), and differentiation of organizational form, size, and therefore resource dependence (McPherson, 1983). To our knowledge, a decreasing effect of organizational differentiation *per se*, i.e., heterogeneity in organizational structure and managerial incentive schemes, on the intensity of rivalry has otherwise not been established. This could be an interesting avenue for future research.

The concurrence of organizational differentiation and diminished intensity of rivalry could be compared to a phenomenon that often occurs in competitive sailing. Two boats sailing close to each other spoil each other's wind exposure, slowing down both vessels. If one boat tags—one firm chooses a different organizational structure—the negative externality is removed. Subsequently, both boats may tag

again, sailing over different boards—firms use different incentive schemes—but aiming for a common windward destination. In the end, the boats may reach the same destination, but more rapidly than if they had chosen to sail similar routes. The use of different organizational structures and incentive schemes may reduce competition and increase profits, without necessarily benefiting one firm more than the other.

This study can be seen as a first attempt to build a mid-range theory of the interaction between multifaceted organizational design and interfirm competition, positioned between the stream that limits attention to one element of organizational design, such as Fershtman and Judd (1987), and the stream that explores unrestricted, independent-control delegation games, such as Miller and Pazgal (2001). In this study, specific assumptions have been made about the elements of organizational design studied and the timing and information structure of the game. Obviously, many other assumptions could be made to explore the generalizability of our results in other multidimensional delegation games.

For example, the present model consists of a noncooperative, extensive game with simultaneous moves. Alternatively, one may wonder what results would obtain if cooperative, i.e., collusive, behavior were assumed, for example in stage 3, while owners and marketing managers compete noncooperatively. It turns out that the results are very similar whether noncooperative or cooperative behavior is assumed in stage 3. The value of α^* , which delimits the *DD*-subgame from the *DC*-subgame, is slightly less in the case of collusion between production managers than in the case of noncooperative Nash equilibrium in this stage.

Another generalization of the model is to introduce asymmetry between the two firms. For example, one may let the relative bargaining power of the production and marketing departments differ for each firm, i.e., $\alpha_1 \neq \alpha_2 \in [0, 1]$. In Figure 3.8, the equilibrium outcome of the overall model is depicted as a function of α_1 and α_2 .

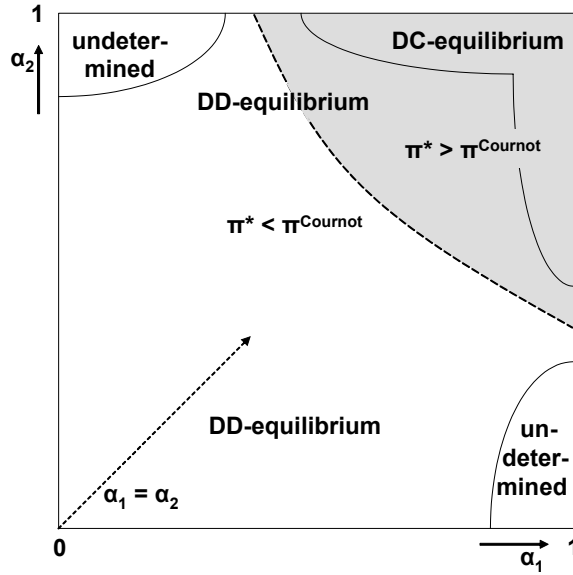


Figure 3.8 The overall solution for $\alpha_1, \alpha_2 \in [0,1]$.

The *DC*-equilibrium obtains in the northeast region of the graph, while the *DD*-equilibrium obtains in the remainder of the parameter space (except for a region where the values of α are very different and the equilibrium is undetermined). In the shaded area, the equilibrium profits in the overall game exceed those of standard Cournot.

Other generalizations of the model could encompass the inclusion of more than two firms, the modeling of other compensation schemes, or the study of price rather than quantity competition. It is possible, although not sure, that the heterogeneous equilibrium is not obtained if competition is modeled between more than two firms. It seems, however, that the softening effect of decentralization will obtain in that more general setting, because it relies on the very general double marginalization effect. The use of other compensation schemes may lead to different results. A crucial aspect of relative performance evaluation is that its use rotates reaction curves, which is not the case in the profit-cum-sales setup of Fershtman and Judd (1987). To the extent that other competitor-oriented compensation schemes, such as market share incentives, rotate reaction curves, results similar to those found in this study are to be expected when these schemes are used. Studying *quantity* competition was particularly interesting in this model because it showed that organizational design may dampen competition even in a situation that typically leads to overly aggressive

behavior. However, it would be valuable also to explore the effect of multifaceted organizational design on *price* competition, which may lead to very different results.

Future research should further explore the relationship between multifaceted organizational design and product-market competition. The use of different, and potentially more general, assumptions could establish under what conditions the main contributions of this study hold: endogenous firm heterogeneity and collusive outcomes in a noncooperative context.

4. Empirical Investigation of Managerial Incentives and Competitive Interaction

4.1. Introduction

Over the years, competitive strategy research has examined the dynamics of competitive interaction, including market entry and exit, price rivalry, and other forms of competitive engagement. This research typically depicts firms as unitary actors: it is the firm that makes competitive decisions about the nature and intensity of competitive behavior, with the objective of optimizing firm performance. This view downplays the heterogeneity of internal organization within most firms. In most organizations, competitive decisions are delegated to managers whose incentives may be imperfectly aligned with the interests of the organization as a whole. For example, with the growth of multiunit and multidivisional organizations in many sectors of the economy, units operated by owner-managers may compete head-to-head with units operated by professional managers of multiunit organizations. In some situations, firms may even delegate competitive decisions to external independent agents, dealers or franchisees, while their competitors delegate these same decisions to managers inside the firm. Unfortunately, competitive strategy research has not sufficiently explored the competitive interaction among firms with diverse organizational forms.

Delegation of competitive decisions requires a parallel consideration of the design of incentive and control systems. Incentive and control systems determine which decisions or tasks are delegated, the limits of the delegated authority, and what the explicit and implicit incentives are for the decision-maker. Inside an organization, managerial incentives may be shaped by managerial compensation schemes, expectations of career progression, span of control, administrative rules, organizational structure and culture, and other organizational characteristics. Differences in incentive systems among organizations may lead to different competitive behaviors, and may affect the outcome of competitive interactions. For example, managers who receive incentives based on market share objectives may act more aggressively

in their market than those with strict financial goals (Gupta and Govindarajan, 1984). Managers may be rewarded for adhering to a corporate-wide pricing policy or encouraged to adapt prices to local market conditions. Managers with incentives based on unit performance rather than firm-level performance may be more willing to engage in competitive actions that may cannibalize other revenue sources of the firm (Christensen, 1997; Chandy and Tellis, 1998). When competitive decisions are delegated to external agents, like franchisees or dealers, the explicit and implicit incentives in the relationship determine the influence of the firm over these external agents. Since these external agents are residual claimants, they have discretion over those actions not explicitly contracted with the firm, and have strong incentives to focus on their own performance.

Some organizational theories, such as transaction cost economics, agency theory, organizational ecology, and contingency theory, have examined the outcomes of competition among organizational forms. Usually, these theories propose adaptation and selection mechanisms whereby more efficient organizational forms are selected by the environment. Yet, these theories have often glossed over how organizational forms may interact in oligopolistic competitive contexts. The argument has been that competitive selection is determined by “economizing”, rather than “strategizing” (Williamson, 1991). When the intensity of rivalry is exogenously given, only superior efficiency determines the competitive success of organizational forms. However, when organizational forms interact in oligopolistic competitive settings, the organizational choices of a firm affect its competitive actions, the intensity of competitive interactions in the market, and, ultimately, the performance outcomes. Consideration of the strategic competitive effects of organizational forms is important for understanding their ultimate performance, yet this dimension has been largely ignored in the existing literature.

This study contributes to the literature by examining the effects of a particular dimension of economic organization, ownership form, on the competitive behavior of firms. We define ownership form as the allocation of ownership rights to the various activities that compose a firm’s extended value chain. Our research examines

whether the ownership form used by multiunit organizations has an effect on the competitive behavior of organizational units in their local market. Multiunit organizations, ranging from multiunit retail chains to multi-divisional or multinational corporations, are important to the economy (Greve, 2003), and have considerable shares in some industries, like restaurants, retail, hotels, and auto services (Ingram and Baum, 1997). These organizations may differ in the ownership form of their units. For example, the local competitive activities of soft-drink companies are carried out by bottlers, yet some bottlers are fully-owned by soft-drink companies, while others are partially owned, and still others are independently owned. Multinationals may have units that are fully-owned, joint ventures, or managed by independent foreign agents under contract. Retail chains may have units that are company-owned or franchised. Here, we focus on the latter case, as we examine the effect of ownership form of hotel units on their competitive behavior in their local market.

This chapter is the first to empirically investigate how incentive divergence, caused by ownership forms, affects competitive behavior across different competitive contexts. We test our hypotheses on a unique dataset that includes virtually all hotels in Texas from 1997 to 2002, competing in over 800 local markets. The panel data allow us to examine the relationship between ownership forms and competitive behavior across a wide variety of competitive contexts, while controlling for alternative explanations and sources of unobserved heterogeneity. A better understanding of the competitive consequences of ownership forms would allow firms to design organizations that are more effective at credibly carrying out their competitive strategy. Moreover, in contrast with the current emphasis on efficient organizational design, our view would allow firms to use ownership forms that effectively balance efficiency and strategic benefits.

4.2. Research Design

As concluded in Chapter 2, the empirical investigation of strategic incentives theory is scant. Three fundamental ideas are proposed by the theoretical development of strategic incentives that form the basis for the specific hypotheses that will be tested:

1. Do managerial incentives affect product-market competition? More specifically, under what circumstances do incentives affect competition and in what ways, exactly?
2. Do firms take the effect of incentives on competition and performance into account, i.e., does a feedback loop exist? (In Figure 1.2, this feedback loop is represented by a dashed line connecting competition back to organizational form).
3. Do managerial incentives, mediated by competition, affect performance? More specifically, under what circumstances will incentives improve profitability?

The purpose of this empirical study is to address, at least partially, these three fundamental questions. Given the objective of this study, the following structural, heterogeneity, availability, and significance requirements that have to be dealt with.

1. **Structural requirements**

- 1.1. Product-market competition. Competition must take place in the form of an oligopoly. In a monopoly or perfectly competitive situation, strategic interaction does not occur, and strategic incentives theory is thus not applicable.
- 1.2. Product homogeneity. The product must be sufficiently homogeneous to make cross-market price comparison possible. For example, using supermarket data could be difficult, because product-mix effects may mask the strategic incentives effect. (Firm-fixed effects could partially alleviate this problem if we obtain longitudinal data).

2. **Heterogeneity requirements**

- 2.1. Heterogeneity in incentives. Heterogeneity (variance) is necessary to obtain significant results that can either confirm or invalidate the predictions of the tested theory. Heterogeneity may arise from the following sources: (1) franchise fee (independent – franchised – company-owned), (2) ownership/governance

issues (profit maximizing versus mutual ownership, independent versus company-owned), (3) (executive) compensation schemes, and (4) organizational structure (transfer pricing, divisional structure, double marginalization).

- 2.2. Heterogeneity in competition. There should be enough variance in prices. A regulatory authority should not determine prices.

3. Data availability requirements

- 3.1. Competition data. First preference: price. Other options: entry/exit, quantity, product “location”, cannibalization (time between releases), etc. Competition data is generally perceived as being relatively sensitive; firms often do not want their competitors to be aware of all their moves. Regulation of the industry may be helpful to ensure the existence and public availability of competition data.
- 3.2. Incentives data. Incentives data, such as compensation, is perceived as being even more sensitive than competition data, because of its private (personal) character. It may therefore be very difficult to obtain managerial incentives information from multiple companies that are in direct competition. An alternative is to gather information about franchising, ownership, organizational structure, and to infer managerial incentives from these data. As a further alternative, executive compensation data for top-level managers can be obtained relatively easily.

4. Significance requirements

- 4.1 Localized competition. For significant results, we need to obtain data from 50 or more markets. Localized competition would be optimal because the similar markets can be compared. Examples of localized competition are gas stations, hotels, and restaurants. Examples of competition that is not localized are financial instruments such as stock markets, and global oligopolies such as the aircraft industry.

4.2. Longitudinal data. Significance can be improved if we obtain data over multiple periods, assuming enough inter-period heterogeneity.

In the light of the above-described data requirements, four alternative data-gathering methods are compared and evaluated: industry specific, cross sectional, compensation consultants, and survey approach.

1. **Industry-specific approach.** Examples of industries that seem suitable for empirically testing strategic incentives theory include car retailing, hotel industry, banking, video rental, and the cellular industry. Benefits: industry-specific data allows for specific controls, and an appropriate setting can be chosen. Drawback: generalizability.
2. **Cross-sectional approach.** A cross-sectional approach would make use of public sources such as Compustat, CRSP, Forbes, ExecuComp, etc. The compensation of top-level companies that are listed on the stock market is publicly known. Benefit: data availability is good (cheap, easy). Drawback: it may be difficult to theoretically link executive compensation and product-market competition. This is specifically true for large, diversified companies (note that most companies that are listed on the stock market are diversified). Data about branch managers is typically not available. The banking industry may be an exception to this rule, because of regulation.
3. **Obtain data from compensation consultants.** Consulting firms, such as Hay Consultants, systematically gather data about management compensation. Benefit: these data tend to be fine-grained and available both from top-level and middle management. If the data cover multiple industries, the results could be more generalizable than in the case of the industry-specific approach. The data may be costly to acquire. Drawback: it is not sure that the data that are available identify specific companies in specific markets (without this, it is not possible to link incentives data to compensation data). To study competitive interaction, we need to obtain compensation data of firms that compete in the same market.

4. **Survey approach.** A survey could be sent to several companies competing in the same industry, requesting compensation data for middle and top management, but also including other items such as perceptions about competitors and competition. Benefit: in the case of gathering primary data, we can structure the survey in such a way that it is tailored to the specific needs of this study. Drawback: it may be difficult to obtain access to companies, especially if these companies are direct competitors.

We have explored the above-described methods, using different information sources and focusing on different industries. We have found that an industry-specific approach, using the Texas hotel industry as a setting, was most promising in terms of satisfying the identified requirements.

4.3. Theory Development

4.3.1. Ownership Forms and Competitive Behavior

Ownership may affect competitive behavior to the extent that ownership shapes the incentives of managers that take competitive decisions. Ownership could relate both to vertical relationships, i.e., regarding upstream suppliers and downstream buyers, and horizontal relationships, i.e., regarding various units supplying similar goods in the different local markets or segments.

Economics has studied how vertical ownership forms affect competitive behavior. For example, Spengler (1950) argues that a vertically integrated monopolist charges a lower price than two vertically adjacent monopolists. The reason is that the downstream monopolist purchases the goods at a margin above costs and thus applies a profit margin on top of the margin at which the goods were purchased. This results in an accumulation of margins, referred to as double marginalization. In the absence of competition, double marginalization will increase the price for the end consumer to an inefficiently high level. This effect occurs in any situation in which both firms have some form of market power. There has been ample empirical support for this argument. For example, Muris, Scheffman, and Spiller (1992) find

that consumer prices were higher for systems of independent bottlers than in the case of integrated soft-drink bottlers.¹⁶

Differential competitive behavior depending on the horizontal ownership form emerges if some form of spillover exists. Spillovers are present if the behavior of one unit affects another unit, in terms, for example, of its reputation or demand. Examples of this phenomenon include both negative and positive demand spillovers. A low price at one unit could increase demand, not only for that unit but also for other units that belong to the same chain (positive demand spillover). Alternatively, a low price at one unit could cannibalize demand of other closely located units that are perceived as substitutes (negative demand spillover). In the case of independently owned units, the spillover is treated as an externality, while the spillover effect is internalized in the case of multiunit ownership, where the same owner owns both units. The presence of demand spillovers consequently creates a difference in competitive behavior depending on the unit ownership (Lafontaine, 1999).

Another spillover that may affect competitive behavior is free riding. The quality reputation of a single unit could affect the reputation of the chain as a whole, which is internalized if the units belong to the same owner, but treated as externality if that is not the case (see, for example, Martin, 1988). Agglomeration effects between closely located establishments are discussed in Chung and Kalnins (2001). In conclusion, both vertical and horizontal ownership changes could potentially affect the competitive behavior of individual units.

4.3.2. Strategic Incentives Theory

The value of commitment as a way of strategically influencing one's competitors has been a crucial topic of research in competitive strategy and game theory (see, for example, Ghemawat, 1991). A commitment that is both observable and irreversible limits the action space of an actor, which affects the payoffs of its rivals and, ultimately, the optimality of its rivals' reaction possibilities. In game theory, Stackelberg games show how a leader can use commitment to benefit from the strategic reaction

¹⁶For a review of the determinants and effects of vertical integration, see Perry (1989).

of the follower (Fudenberg and Tirole, 1991).

Commitment can take many forms. Schelling (1960) discusses the use of delegation of authority to an agent as a means to credibly commit to a certain course of action. He provides the example of a negotiation in which one party sends a delegated agent as opposed to participating personally in the negotiation. By choosing an “irrational” agent, a rational player could credibly commit to an action that would otherwise not be credible. Therefore, the strategic use of delegation creates the possibility to influence the reaction of competitors in ways which would otherwise not be possible.

Vickers (1985) explores the implications of the concept of strategic delegation for the theory of the firm. He points out that while owners are typically assumed to have profit maximizing incentives, the same does not necessarily hold for the managers who populate a firm. The presence of delegation within firms could allow them to benefit from strategic effects that would otherwise not be possible. In sum, Vickers argues that “the separation of ownership and control of a firm may be a good thing for the owners, because non-profit-maximizing managers may earn higher profits than would profit-maximizers” (p. 139).

The idea of strategic incentives within the boundaries of the firm has subsequently been modeled formally by Fershtman and Judd (1987) and Sklivas (1987). In these game-theoretical models, in the first stage, owners determine the incentive schemes of their managers, and in the second stage, managers compete in a product market. These papers show that the optimality of the incentives provided in the first stage critically depends on the nature of strategic interaction in the second stage. Two different, and in many respects opposite, forms of strategic interaction can be distinguished. In the first one, firms have an incentive to commit to aggressive behavior, because that would preempt the competitors. In the second, it is beneficial for firms to commit to accommodating behavior, because that would lead to an accommodating response from the competitor.

A typical example of a competitive context which encourages aggressive behavior is investment in production capacity. If the size of a market is limited, the optimal

investment of a newly entering firm is negatively related to the already existing capacity. Thus, aggressive behavior leads to preemption. Incumbent firms can take advantage of this by investing at high levels of capacity, which will reduce the new capacity invested by the entrant, or even completely deter entry. Fershtman and Judd (1987) and Sklivas (1987) show that owners will encourage their managers to behave aggressively and invest extensively to discourage investment by their competitors.

Price competition in differentiated goods without significant threat of new entry is a typical example of a situation in which actions do not move in the opposite, but in the same direction. A price decrease originated from a competitor should be followed by a price decrease of the focal firm to avoid a significant loss of market share. Likewise, a price increase by a competitor increases the residual demand of the focal firm, which induces the focal firm to increase its price, too. Thus, accommodation is followed by accommodation and aggressiveness by aggressiveness.

Standard oligopoly theory shows that prices in the case of price competition in differentiated goods are typically lower than the monopoly prices that maximize firm profits (Vives, 1999). This means that firms could increase their profits if they were able to raise prices collectively. However, each firm individually has the incentive to lower prices to capture a larger share of the market. Promising to increase prices is not credible because of each firm's individual incentive to renege on this promise. If a firm were able to commit to increase its price – or equivalently to refrain from discounting – its competitors would be expected to follow and increase their prices too. This strategic reaction would increase the profits of the focal firm. Thus, in the case of price competition in differentiated goods, firms would want to commit to setting high prices with a view to increasing the average industry price.

While Fershtman and Judd (1987) and Sklivas (1987) focus on the strategic use of incentives within the firm, strategic incentives theory is not limited to incentives that reside within the boundaries of the firm. Bonanno and Vickers (1988) examine the strategic effect of changes in incentives due to vertical integration and separation. The next section discusses how strategic incentives theory applies to ownership forms

in the context of multiunit organizations.

4.3.3. Context: Multiunit Organizations

In this chapter, we hypothesize about how strategic incentives theory applies to multiunit organizations. Multiunit organizations, which have recently been discussed extensively (e.g., Ingram and Baum, 1997; Greve and Baum, 2001; Greve, 2003) are defined as organizations, such as restaurants, hotels, retail chains, and multinationals, that operate in multiple markets through several distinct units. One reason for this enlarged research interest may be the realization of the rapidly growing importance of this kind of organization. Ingram and Baum (1997) suggest that “chains will eventually come to dominate every service industry that is characterized by some direct contact between customers and organization” (p. 69). Greve and Baum (2001) point out that multiunit organizations are not only prevalent in service industries, but are also frequent in the manufacturing sector. Another important reason for the surge in research interest in multiunit organizations is the challenge this organizational form poses for conventional theory. Greve (2003) points out that the multiunit form highlights the shortcomings of theories that are based on the premise of organizations as unitary actors in a unitary environment. Multiunit organizations face an interesting interplay between cross-unit learning and competitive behavior. Moreover, as noted by Greve, multiunit organizations have more strategic choices than other organizational forms.

The relevant literature on multiunit organizations can broadly be divided into two groups. The first is concerned with the question of what the benefits and drawbacks of multiunit organizations are in comparison with single unit organizations. In their study of the Manhattan hotel industry, Ingram and Baum (1997) examine the benefits and drawbacks of chain affiliation. They argue that chains can improve the local unit’s competitive situation by providing resources, reputation, and market power. Ingram (1996) highlights the tension for multiunit organizations between consistency for the chain as a whole and local adaptation. He suggests that the multiunit organization form can solve the problem of free riding through a credible

commitment to superior quality levels.

The second stream of research on multiunit organizations is focused on the differences between ownership forms within the multiunit organization, i.e., the choice between company-owned and franchised units. This choice is affected by the differential characteristics of these two ownership forms regarding the ability to monitor local managers and the incentive for local managers to free ride on brand-name capital and firm specific assets (e.g., Bergen, Dutta, and Walker, 1992; Brickley and Dark, 1987). Another argument for the use of franchising is that the relative ease of obtaining franchisee labor and capital facilitates rapid growth for starting firms (e.g., Combs, Michael, and Castrogiovanni, 2004). The relationship between the franchisor and franchisee is governed in a franchising contract. The contract typically specifies the fees the franchisee should pay, including an initial fee, and royalty, marketing, and reservation fees. In a traditional franchise, the franchisor sells a (semi-)finished good to the franchisee, while in the case of business format franchising, the franchisee obtains the right to use the franchisor's trade name and business plan.

In sum, competition among multiunit organizations as a distinct type of organizations that recently received heightened attention in the organizational theory literature, provides an interesting context for a study of the relationship between ownership form and competitive behavior. Another theoretical mechanism, which has not yet received sufficient scholarly attention, linking ownership form and competitive behavior, focuses on the effect of ownership form on the commitment to particular competitive responses. The application of strategic incentives theory is discussed in the next section.

4.3.4. Effect of Ownership Form in Multiunit Organizations on Competitive Behavior

Strategic commitment through ownership form. Multiunit organizations generally operate in local markets in retail or service industries in which goods are

differentiated and the main dimension of competition is pricing.¹⁷ As described above, in this context firms can increase their profits by committing to set high prices. The main difficulty is developing a credible commitment mechanism that signals an irreversible change in the degrees of freedom for the focal firm.

Ownership form in multiunit organizations is a means to create a strategic commitment device because it affects managerial incentives and is both observable and costly to reverse. However, the ownership forms multiunit organizations may use – franchising and corporate ownership – differ significantly in the way they affect competitive behavior.

The franchising ownership form entails a full and contracted delegation of authority to the local unit, i.e., the franchisee. While the brand owner can impose certain guidelines aimed at guaranteeing a consistent level of quality throughout the chain, the franchisor cannot require specific competitive behavior from the franchisee. In the United States, this autonomy is well anchored in legal contexts prohibiting the franchisor to interfere in the competitive behavior of the franchisee.¹⁸

In light of this, the imposition of a royalty fee is the only way to influence the competitive behavior of the local unit. In a variety of industrial contexts, franchised units have been found to set higher prices than company-owned units, arguably due to double marginalization (see Lafontaine and Slade, 1997, for a review of this literature). This effect holds both in the case of traditional franchising, where the franchisee purchases a (semi-)finished good from the franchisor, and in the case of business format franchising, where the franchisee pays a royalty fee for the use of a trademark. In the latter case, it is crucial to note that royalty fees are typically a percentage of revenues rather than a percentage of profits (Lafontaine and Shaw,

¹⁷Multiunit organizations also operate in manufacturing industries in which capacity is crucial to competition. The possibility to apply strategic incentives theory to understand the relationship between ownership form and competitive behavior is not limited to the case of price competition. In the case of capacity competition, the logic of strategic incentives theory is the same, but the provided incentives would be the opposite. For simplicity and because price competition seems to be the most important competitive context for multiunit organizations, we limit the discussion to this case.

¹⁸See Lafontaine (1999) for a discussion of the position of the US Supreme Court regarding resale price maintenance in the franchising context.

1999). While the payment of a fee that is a percentage of revenues distorts competitive behavior in the same way as double marginalization does, the payment of a fee based on profits would not (Schmidt, 1994).

The royalty fee, however, is an imperfect tool of influence for several reasons. First, instead of being able to dictate exactly the price a franchisee should charge customers, the precise effect of the royalty fee may depend on exogenously given factors that determine whether its imposition results in the desired price level or not. Second, the franchisor only captures part of the price increase, while the franchisee captures the remainder. Finally, while the optimal level of royalty fees would be contingent on the competitive context, they are the same for all franchisees, and therefore cannot adjust to local competitive circumstances.¹⁹

A fundamental difference between company-owned and franchised units is the autonomy of the management at the local level. While franchisees have full autonomy over their competitive behavior, corporate headquarters of a chain are free to decide what level of autonomy is given to managers of local units. The corporate office could decide to let local managers operate relatively freely, while obviously respecting the quality standards that define the brand, or it could decide to provide strict rules and guidelines detailing not only operational procedures but also competitive actions such as pricing. The choice of the degree of granted autonomy and the possibility to shape the incentives of the local manager create the opportunity to use this delegation relationship in a strategic manner.

The optimal incentive scheme with which the manager of a company-owned unit is provided, should reflect the local competitive context, i.e., *ex ante* adaptability, while it should be irreversible once in place, i.e., *ex post* rigidity. The incentive scheme should reflect the local competitive context because demand and supply characteristics jointly determine optimal competitive behavior and, ultimately, the optimal incentive scheme. *Ex post* rigidity is necessary because the commitment would otherwise not be credible.

¹⁹To prevent franchisors from treating franchisees in an “unfair” way, the US Trade Commission adopted a national disclosure standard in 1995, based on the Uniform Franchise Offering Circular, issued by the International Franchise Association (Dailey, 1998).

Anecdotal evidence seems to indicate that the administrative policies that govern the relationship between corporate headquarters and unit managers are indeed *ex ante* adaptable and *ex post* rigid. (Please refer to Section 4.5 for the main findings of a field study that addressed these issues). Chains typically develop a pricing policy within which local managers have to operate.²⁰ There is some suggestion that uniformity of prices across company-owned units could be beneficial for the chain as a whole, but empirical research shows that franchisors do not try to achieve wholly uniform prices across their company-owned units (Lafontaine, 1999).²¹ Corporate headquarters habitually use annual budgets in which detailed information is included about price levels for different products and the quantity of the output. These budgets are decided upon after some form of negotiation with the local units. The obligation to act according to the described administrative system, consisting of a pricing policy and an annual budget, significantly restricts the local manager's autonomy. This restriction is not easily changed because of the costs of implementing this administrative system. Moreover, for reputational reasons within the firm, headquarters have an incentive not to renege on the internal contract.

Within a local market, the providers of similar products and services generally know one another relatively well (Ingram and Roberts, 2000). This means that they are typically aware of their local rivals' competitive behavior and the agreements and policies that govern their actions. However, direct observability of the incentive contract is not a necessary condition. Katz (1991) shows that unobservable contracts can typically also serve as commitment.²²

The next subsections develop hypotheses that explore the effect of strategic incentives and royalty fees on pricing behavior.

²⁰Interviews with managers of local company-owned units and corporate managers responsible for pricing seem to indicate that local conditions in terms of demand and competition are taken into account when the pricing policy is put in place.

²¹Lafontaine (1999) studies pricing at fast-food restaurants, which could be considered as relatively homogeneous goods. As goods become more heterogeneous, the ability and desirability to charge uniform prices further decreases.

²²More precisely, Katz (1991) shows that unobservable contracts can be used as commitment in the presence of moral hazard and risk-averse agents, or in the presence of asymmetric information. He argues that this is typically the case.

Effect of strategic incentives on competitive pricing. In a setting of price competition with differentiated goods, an optimal incentive would encourage the local units to keep prices relatively high and refrain from discounting. Providing such an accommodating incentive would result in an increased price level for the focal firm and encourage a similar response from the direct competitors.

The benefit of commitment, however, depends on the extent to which strategic interaction plays a significant role in a given market. As the number of firms in a market increases and the market concentration decreases, strategic interaction decreases and the benefit of strategic commitment dissipates. In a market with a large number of competitors, communication and coordination become more difficult, which decreases the potential gain of commitment (Stigler, 1964). In the extreme case of perfect competition, there is no strategic interdependence, and firms would not set incentives that induce accommodation. Thus, the price premium resulting from strategic delegation increases as the market becomes more concentrated.

The *ex ante* adaptability to local circumstances and *ex post* rigidity of the relationship between the corporate level and the manager of the company-owned unit allow chains with company-owned units to benefit from strategic delegation. Because of the full autonomy of franchised units regarding their pricing behavior, these units cannot credibly commit to setting high prices. The difference in the governance mechanism between franchised and company-owned units leads to the following hypothesis.

Hypothesis 4.1 *The price difference between company-owned units and franchised units is positively related with market concentration.*

Effect of royalty fees on competitive pricing. Because of double marginalization, royalty fees provide the incentive to franchisees to increase the price charged to the end customer. Schmidt (1994) shows theoretically that this distortion should directly depend on the magnitude of the royalty fees. Royalty fees are a percentage of revenues and could, therefore, either be interpreted as costs or as a decrease in revenues. The following figure shows that, if residual demand is downward slop-

ing, the payment of a revenue-based royalty fee decreases the output quantity and increases the price.

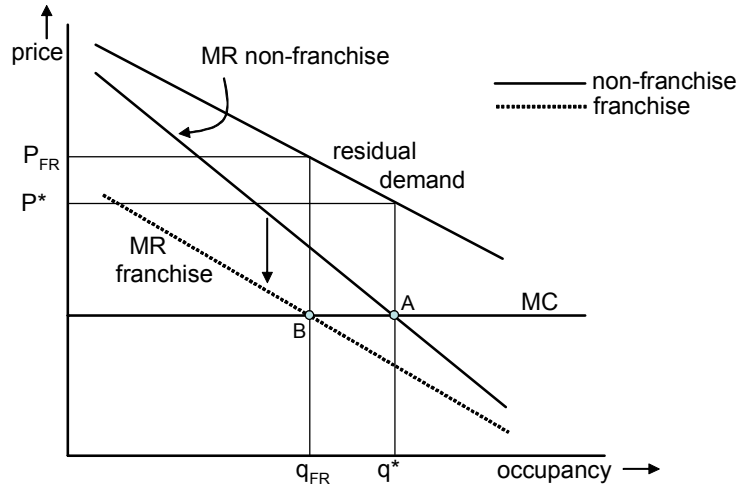


Figure 4.1 Decrease in marginal revenues increases price.

The ability to increase price, however, depends on the competitive context. In the extreme case of perfect competition in the final market, where no individual firm has any market power, the market price is given and the cost structure may affect survival chances but not pricing behavior. Tirole (1988) explains that the markup depends on both the elasticity of demand and the degree of substitutability with competing products. The markup is zero in the case of perfect competition, i.e., perfect substitutability, while it is maximal in the case of monopoly, i.e., no substitutability. The extent to which franchised firms can pass on the royalty fees thus critically depends on the competitive context. This leads to the following hypotheses.

Hypothesis 4.2a *The price charged by franchised units is positively associated to the royalty fees these units pay.*

Hypothesis 4.2b *The sensitivity of the price charged by franchised units to the royalty fees is positively associated with market concentration.*

4.4. Empirical Setting

4.4.1. History of the Hotel Industry

The first record of hotel industry activity dates back to 2000 BC, when inns in Babylonia were obliged by regulation to register their inn-keeping activity.²³ The first US hotel was the City Hotel in New York, which was established in 1794, and comprised 73 rooms. In the 1950s, mobility in the US increased significantly and the motel concept caught on. Kemmons Wilson established the Holiday Inn chain in 1952. Reportedly, he was unhappy with the large variance in hotel quality on trips with his family. He aimed at building a “modern hotel” that would offer travelers the certainty of a good quality hotel. Wilson managed to build a national chain, using franchising as a way to expand rapidly. This approach would revolutionize the industry. In the 1980s and 1990s, some large companies, such as Marriott and Accor, introduced a differentiated multi-brand approach. For example, Accor uses in France six different brand names, each targeted at a different segment: Formule 1, Etap Hotel, Ibis, Novotel, Mercure, and Sofitel. The 1990s were characterized by merger and acquisition activity, leaving the industry with a few key multi-brand hotel companies that now control most recognized brands.

4.4.2. Cost Structure

The hotel industry is relatively capital intensive, with significant investments in real estate and equipment. Operating costs could be divided roughly in one-third for direct room costs and two-thirds general costs (interview with Vice President of a hotel corporation). According to a study by De Roos and Rushmore (2000), 30 - 50% of the room expenses are variable when a one-year horizon is used. Hotels often have a restaurant and a bar. This study, however, focuses on the room activity of hotels.

²³The paragraph on the history of the industry is based on Rushmore and Baum, 2002.

4.4.3. Competition

The hotel industry is characterized by local competition, i.e., hotels compete directly with those that are located in the same area, but not with hotels that are located in a completely different part of the country or state (Baum and Mezias, 1992).²⁴ Hotels differ both in terms of their quality (e.g., star rating) and their location. Therefore, hotel services are goods that are differentiated both vertically and horizontally. In this study, we focus on the short-run competitive dynamics between hotel establishments, where the capacity of each hotel is taken as given, and where competition therefore takes place in terms of quality and price.²⁵

4.4.4. Ownership Form

The ownership form of individual establishments in the hotel industry plays an important role in this study, because we infer the incentives of the local establishment manager from the ownership form. Hotel establishments can be one of any of the following forms:

- Independent hotels – The owner/manager operates the hotel under its own name.
- Company-owned hotels – The manager operates the establishment, which is owned by the company that also owns the brand name.
- Franchised hotels – The franchisee owns the establishment, but pays a franchise fee for the use of the brand name and other services.²⁶

²⁴Location could be defined in various ways. Baum and Mezias (1992) determine the exact location of hotels in Manhattan using the numbering of streets and avenues. Chung and Kalnins (2001) use the five-digit zip code as a definition of the local market. Conlin and Kadiyali (1999) use both the city level and the country level as a market definition.

²⁵The formal way to represent the competitive interaction in the hotel industry is in a differentiated Bertrand price competition model with capacity constraints, controlling for quality (Vives, 1999).

²⁶In traditional franchising, the upstream producer sells to the downstream retailer. In contrast, with business format franchising such as is the case of the hotel industry, the franchisor does not provide a physical product but a brand name, marketing support and other services in exchange for an initial fee and, typically, a percentage of revenues.

- Hotels under management contract – The establishment owner contracts out the management of the establishment to a third party.

Independent hotels. The independent hotel represents the comparison benchmark in this study. We assume that the manager/owner of an independent hotel has the objective to maximize its own profits, because the manager is the residual claimant. In this study, we analyze whether managers of company-owned hotels and franchised hotels have incentives that differ from the pure profit-maximization incentives the manager/owner of the independent hotel has, and how these incentives are reflected in their competitive behavior.

Company-owned hotels. In contrast to independent hotels, we consider establishments owned and managed by the company that also owns the brand name. Most of the brand owners in the hotel industry operate some or a considerable number of establishments themselves. For example, Motel 6 operates 85% of the establishments that use its brand name, the remainder being franchised.

We examine whether and how the incentives of managers that run these company-owned establishments might differ from the incentives of independent owner/managers. The hotel managers' rewards typically reflect a broad range of performance objectives for the establishment and the organization. Even if part of their reward is based on the performance of their establishments, these managers do not act as residual claimants, thus creating the possibility of the strategic use of their incentives.

Franchised establishments. Franchising has become very popular in the US hotel industry since the concept was adopted in the early 1950s. For example, Comfort Inn comprises close to 1,700 franchised hotels. In the US hotel industry, the offerings of most franchisors are known (Rushmore and Lee, 2002), because US legislation requires franchisors to have uniform franchise offerings for all franchisees.

The uniformity of franchise offerings leaves little room for strategic play with franchise fees. At the same time, the franchise fee itself changes the manager's incentives from those of an independent hotel manager. The franchise fee in the hotel industry typically consists of an initial fee (usually based on the number of rooms of the hotel), a royalty fee (usually based on the gross room revenues), a share in

the corporate marketing costs, a fee for revenue directly generated by the franchisor, and miscellaneous fees for services such as software or training (Rushmore and Lee, 2002).

Management contract. In some cases, the establishment owner does not manage the establishment. This happens most frequently in the case of large hotels that are owned by a (real estate) investment company, which outsources the management of the establishment to the hotel corporation that also provides the branding of the hotel. While there are some differences between this ownership form and the company-owned form, in terms of incentives these two forms resemble each other most, because they are both managed by a professional manager.

4.4.5. Pricing Policy

The pricing policies used range from very simple “one price fits all” to sophisticated revenue management systems used by large hotels and hotel companies. Owner/managers of franchised hotels may obtain general advice about pricing policies from the franchisor. Legally the franchisor may not influence pricing decisions taken by the franchisee. In the case of company-owned hotels, the head office typically sets pricing policies, and delegates actual pricing decisions, such as discounting, to the hotel manager who is better aware of local demand characteristics. From interviews with industry participants, it seems that the level of discretion for the local managers is relatively restricted – they operate within strict rules and guidelines of the head office. (A more detailed description is included in Section 4.5).

4.4.6. Texas Hotel Industry

The Texas state government requires all properties exceeding US\$16,600 quarterly room revenues to report these revenues on a quarterly basis. This has allowed consultants and researchers to use this public information (e.g., Chung and Kalnins, 2001, Conlin and Kadiyali, 1999, and Conlin, 2003). In Texas, approximately 3,500 hotel establishments compete in nearly 500 local markets, characterized by the five-digit zip code (Chung and Kalnins, 2001). The total size of the Texas hotel industry

is approximately US\$4 billion, growing at an annual rate of 7% for the ten years through to 2001. The average occupancy rate in the Texas hotel industry is between 55 and 60%.²⁷

4.5. Field Study

4.5.1. Introduction

As part of the dissertation, a field study was conducted. The purpose of the field study was to test the validity of some assumptions that underlie the theoretical development, to refine understanding of the hotel industry, and to verify the validity of our conclusions. Some examples of tested assumptions include whether competition is correctly characterized as strategic complements and whether competition is perceived as a local phenomenon. The understanding of the hotel industry included phenomena such as the value chain, customer segments, competitive strategies, pricing and other policies, organizational forms, etc. Finally, we discussed the conclusions of our empirical study of strategic incentives with some market participants to verify the face validity of our findings.

Between 2002 and the beginning of 2005, we spoke with approximately 25 industry participants, including, among others, managers of company-owned hotels, owners of franchised hotels, top-level and mid-level managers of hotel corporations, academics with an expertise in the hotel industry or yield management, consultants, and the research director of the American Hotel & Lodging Association.

The remainder of this section is structured as follows. We first discuss some characteristics of the hotel industry, its participants, and customers. This is followed by a description of the competitive and pricing strategies and practices that are used in this industry. We then discuss sales force management and internal organization of different ownership forms. Moreover, we depict how some industry participants think about the ability of company-owned establishments to commit to price leadership. Finally, we provide some conclusions from this field study. A list of the interviewees

²⁷The statistics on the Texas hotel industry are obtained from the Texas Hotel Performance Factbook, Source Strategies Inc.

and their organizations (made anonymous) is included in Appendix C.

4.5.2. Hotel Industry

What customer segments and product groups should be distinguished? What distribution channels are used? What is the influence of the internet on the hotel industry?

Interviewees typically distinguish contract business from transient business. The contract business includes, among others, group travel, conventions, and annual contracts. Transient business could either be with or without a specific price agreement (for example, AAA membership discount). Various distribution channels can be distinguished, such as travel agencies, operators, travel internet websites such as Expedia and Travelocity, the hotel establishment website, and the corporate website. Hotel corporations are currently trying to achieve rate consistency, guaranteeing the best price on their own hotel establishment or corporate website.

Some interviewees argue that the internet makes competition more intense: “The internet can make you more aggressive. You can kick out a competitor by being \$5 cheaper.” (John, franchisee/owner of three hotels in Dallas, Texas). This franchisee explained that his hotels can be found on 126 websites. He spends a significant of his time checking the websites. “I have personal connections to make sure that I get favorable exposure on the internet.”

Which kinds of ownership can be distinguished? Which parts of the value chain are typically owned together?

The value chain can be characterized as consisting of the following elements: (1) brand ownership, (2) ownership of the establishment, and (3) management of the establishment. A typical independent hotel is owned and management by the same entity (value chain ownership could be written as AAA, which signifies that the same company owns the brand, owns the establishment, and manages the hotel).

A typical franchised hotel is characterized as ABB: a hotel corporation A owns the brand, while the franchisee owns the establishment and manages the unit. A company-owned hotel is generally characterized as AAA: the hotel corporation owns the brand, the hotel establishment, and manages the hotel through a professional

manager. A managed hotel is owned by a third party (typically an investment fund), but managed by the hotel corporation (characterized as ABA). The four ownership forms described above cover most of all hotel establishments. Some exceptions exist, for example a hotel that is owned by an investment company but managed by a third party (ABC).

Some hotel corporations focus on franchising and do not own or manage properties (e.g., hotel corporation #1). Other corporations own most properties or own some brand that are predominantly company-owned and some brand that are both company-owned and franchised (e.g., hotel corporation #4). Still other hotel corporations have all three branded ownership forms: company-owned, managed, and franchised (e.g., hotel corporation #5).

The management of managed and company-owned hotels is relatively similar “to ensure consistency in the product” (Peter, franchising department of US hotel corporation). The typical management fee for managed establishments at this corporation is a two-tier fee structured as follows: the first tier is a percentage (e.g., 3%) of total (not only room) revenues. The second tier is a percentage (e.g., 10%) of the net cash flow (net operating income minus debt service minus 12% preferred owners returns on equity). The second tier is referred to as “the incentive” and is capped.

The manager of a large, upscale hotel that is managed but not owned by the hotel corporation describes the difficulties of the managed ownership as follows. This hotel is owned by four investors. The manager, Jack, meets with them each month to talk about the business and to convey his perception of the market. He feels as “a circus acrobat who holds a rope that is pulled by two elephants in opposite directions”. Jack reports officially to the hotel corporation, but also “unofficially” to the owners.

4.5.3. Competition

Who are perceived as direct competitors? Do the managers/owners know their local competitors? Do establishments compete in direct rivalry with their local rivals, or

do they compete in terms of “independent” competitive actions?

Most interviewees agree that competition is a local phenomenon. “Our competitive set consists of the 6 hotels that are not more than 4 miles from this hotel” (Matthew, sales manager of a large, upscale company-owned hotel). The manager of another upscale hotel, Jack, argues that large, branded hotels normally ignore independent hotels. “They do not impact the local competitive situation. They have their constant share of loyal customers and we ignore those. However, if there is low market occupancy, the importance of the independents increases. Now, the international hotels want to fill their capacity with the customers that typically would choose the independent hotel. The international hotels are willing to cut the price to convince these customers to come to their hotel.”

Many hotels use benchmark information from Smith Travel Research (STAR report). This report provides the average rate of the competitive set on a weekly basis. Hotel managers seem to know their competitor well. “We call them once and a while. Sometimes we ask them to do us a favor.” (Matthew, sales manager company-owned hotel) “I know my competitors personally. We send each other overflow customers.” (John, franchisee/owner of three hotels). John adds, “I talk with my competitors, I check the internet, I shop around: I want to know what competition is doing.”

While hotel managers know their competitors well and are typically aware of their moves, it seems that this information is not always directly incorporated in pricing. Matthew, sales manager of an upscale company-owned hotel, argues “Although I need to be aware of what the competitors are doing, the competitors’ price doesn’t really matter. If the direct competitor drops its price, we typically do not react the first week. If the market share stays constant, we do not react to the price change. If the market share decreases, we lower our rates for transient, retail customers.”

In the lower segments (budget and economy) rivalry seems to be more direct. “Due to the lack of differentiation in the lowest segment, there is a high sensitivity to each other’s price.” (Paul, VP Pricing large hotel corporation) From the interviews, it seems that managers of franchised hotels are more aware of rival’s prices than

managers of company-owned hotels.

What kinds of price policies are implemented in different kinds of hotels? Do individual customers negotiate the price?

Pricing policies differ per the segment (budget, economy, midscale, upscale, and luxury) and per individual company. Below, some typical comments about pricing policies are described.

Nicolas, Vice President of a European hotel corporation, explains that pricing policies differ per segment. “Our budget brands only have one price. The economy brand has ten prices. Our midscale brand has 40-50 prices, while our upscale brand has 100-200 prices. Of the economy brand customers 90% pays the rack rate; 60% for the midscale brand, 40% for our upscale brand, and only 4% of the luxury brand customers pay the rack rate. Pricing at the luxury brand could be characterized as ‘luxury’ or ‘image’ pricing. After a large renovation, we once doubled the luxury brand’s rack price, which positively affected customers’ perceived service quality.”

Competitor-orientation seems to be especially prevalent in the policy stage, and less prevalent in the competition stage. “When we determine the pricing policy, we look at the competitors and we want to be x% cheaper than the competitors for the same perceived value.” (Paul, VP Pricing hotel corporation) The determination of the pricing policy is relatively similar for independent hotels: “Determining the basic rate for a room is done in comparison with other hotels that are in the same and are comparable in quality. The day-to-day price of competitors is not taken into account.” (Charlotte, manager of an upscale independent hotel)

The price is also determined in relation with costs. Charlotte, manager of an upscale independent hotel, said that rooms have a minimum price, which is based on average total costs (including depreciation), under which a hotel room would not be sold. This minimum price could be used if the hotel is half empty and the manager believes that it could help attract additional customers. It is interesting to note that sunk costs, such as depreciation, are taken into account in the determination of the minimum price. Charlotte provided two reasons for including sunk costs (which inflates the minimum price). She first pointed out that the restaurant is not

profitable, so the hotel needs to compensate for that. Second, she pointed out that it was part of a commercial policy. This hotel would not drop the prices too much because that would hurt credibility and equity, both between customers, and over time periods. Furthermore, there is also a luxury-pricing element: if the hotel is priced too low, then customers may think that there are quality problems.

Price levels react to demand conditions. “In periods of weak demand, the hotel will allot rooms to discount brokers, who in turn sell the rooms for up to 50% less.” (Charlotte, manager of an independent hotel) Chris, revenue manager, explains “Competition is a day-by-day phenomenon. If demand is high, there is a capacity constraint, and direct rivalry is weak. If demand is low, there is more price dispersion, because some establishments are willing to go low, while others are not.”

Some establishment provide discounts to individual customers who want to negotiate, other establishments do not. “We do not allow *fading* (i.e., discounting at the door) for the units we own.” (Paul, VP Pricing large hotel corporation, about lowest segment) Individual discounts seem to be more prevalent in the higher segments (upscale and luxury). Moreover, it seems that independent hotels are more willing to fade than company-owned establishments: “If a customer comes in and asks for a good price on a weekday with the hotel being half empty, the person at the reception has the right to charge the weekend rate (20 % discount). Also, it has happened that a family with children gets a second room for free, taking into account the fact that the whole family stays for dinner in the restaurant.” (Charlotte)

It seems that the hotel industry is less competitive than, for example, the airline industry. Chris, revenue manager of a large hotel corporation, points out that “There seems to be a general understanding in the industry, that prices should be kept high for non-price sensitive customers. It is better to maximize the ADR (average daily rate) than to maximize RevPar (revenues per available room).” He adds that “It is best not to respond to decreases in competitor’s prices. They will sell out early: one competitor less in the market.”

Most interviewees agreed that the average price in the market is below the optimal, or monopoly, price. In other words, increasing the average market price (e.g.,

through collusion, which obviously is illegal) would increase industry and establishment profits. Moreover, the idea that, normally, the best response to a price cut is a price cut and the best response to a price increase is a price increase (strategic complements) was also well accepted.

Some interviewees argued that it is important to keep prices relatively stable over time. Matthew, sales manager company-owned hotel, pointed out, “Rate integrity (i.e., avoiding large differences in rates over time) helps at creating long-term value for the brand.” Other interviewees also noted that they kept their prices relatively stable over time.

What are the yield management procedures and systems in place? Is there a difference between the use of these systems between small and large hotels, franchised and company-owned hotels?

Yield management, or revenue management, techniques, including software, are introduced in the hotel industry some years ago. Large hotel corporations have regional yield managers who typically operate as internal consultants. They provide advice but do not have operational responsibility. Some of the larger hotels may have a yield manager who is dedicated to the establishment. Matthew, sales manager of a large, upscale company-owned hotel, explains, “I use the yield management system to determine the minimum available rate. Sales people do not use the yield management system.” Charlotte, the manager of a relatively small independent hotel notes that “Proper yield management as it is done in the airline industry is not possible for small hotels such as ours.” Another possible reason that yield management is not as well spread as in the airline industry is that “Customers will not accept price differences in the hotel industry as they do in the airline industry. Daily yielding is therefore less possible.” (Paul, VP Pricing of a hotel corporation)

Does competition takes place between individual hotel establishments or between hotel corporations?

It seems that competition in the hotel industry takes place at many levels. This dissertation focuses on the direct competition between local rivals. This implicitly treats the capacity of hotel rooms as exogenously given. Moreover, it does not pay

specific attention to competition between hotel corporations. Nicolas, Vice President of a European hotel corporation, described the interplay between competition on the local and corporate level. “We changed our operating structure. Originally, each chain was managed by a regional (and national) manager. Now, a regional manager manages three chains. The reason behind this restructuring was to decrease cannibalization between the different brands that belong to our group.”

4.5.4. Sales Force Management

What is the discretion of the company-owned hotel manager for pricing? Who decides what in terms of pricing policy and actual price setting in the case of a company-owned establishment?

The degree of delegation and the authority to set prices autonomously varies depending on the hotel segment, the hotel size, and other dimensions. Pricing in the budget segment of large hotel corporations is typically organized centrally. “In the lowest segment, if an establishment wants to change price (for example as a response to competition), they should call the territory manager, who should call me, and I decide for all hotels in the US. In the segment slightly above, the manager may change the price him- or herself, but informs the territory manager, who will inform us. We may decide to interfere.” (Paul, VP Pricing large hotel corporation)

The authority to set prices is more delegated for midscale and upscale establishments. Nicolas, Vice President of hotel corporation, explains that “Nationally a pricing policy is developed per brand. Moreover, the regional manager adjusts or specifies this policy, regarding regional differences. Finally, the establishment manager is the one that ultimately decides, keeping within the broader policies, and consulting higher management. Note, however, that the discretion of local management is relatively small. We are very prudent with giving local management too much pricing discretion. In fact, local management is closely monitored and gets an award if it correctly follows the revenue management system’s recommendations.”

Managers and sales managers of company-owned hotels agree that they do not have complete freedom in setting prices. Matthew, sales manager of a company-

owned hotel, explains that “My possibility to play with rates is limited because of the minimum flow-through requirement.” The flow-through is defined as the gross profits per dollar revenue. In the same vein, Stephan, room department manager of a company-owned hotel, adds “Even if a company owned hotel basically can set its own prices, it still has to play by the corporate rules and stay within a certain bandwidth.”

The sales managers, in turn, tend to closely monitor the salespeople. Matthew clarifies: ““In the sales meeting, each morning, we discuss all open contracts. Salespeople have to explain the rate offered in terms of needs and values (customer needs and establishment values). Giving a discount because the competitor gave a discount is unacceptable.” Probably as a result of the close supervision and the existence of subtle rules, Matthew notes that salespeople do not tend to be too aggressive. “They tend to be careful, sometimes too careful.” The same close involvement is noted in the case of an independent hotel: “As the owner of three franchised hotels, I am very involved in everything that happens at each hotel. Every morning, I have sales meetings at each hotel.” (John, franchisee/owner of three hotels).

What is the discretion of the franchisee for pricing? Who decides what in terms of pricing policy and actual price setting in the case of a franchised establishment?

The franchisor cannot dictate the consumer price to the franchisee, because that would be considered price fixing, or resale price maintenance, which is not allowed by law. In the words of Sarah, who works at the franchising department of a hotel corporation, “The chain will provide guidelines for the price the franchisee can charge to customers (a range). This ‘target’ price range depends on things like the brand, location, etc. However, if business is slow, the hotel owner can decide to provide discounts. The franchisee is free to do that”.

What are the objectives for hotel managers or sales managers?

Although some interviewees mention the use of profit objectives, it seems that the typical objectives are provided in terms of occupancy rates, prices, or market share. Matthew, sales manager of a company-owned hotel, explains that “As a sales manager, my first responsibility is to gain market share. I am not responsible for

profits.” Nicolas, Vice President of a hotel corporation, argues that “First, management should try to maximize the occupancy rate. Then, if occupancy of 80% is reached, management should try to maximize the average room rate. This is to be applied on daily occupancy and room rates.”

What compensation systems (bonuses, incentives) are used?

The interviews have surveyed both the US and the European situation. The use of bonuses has been used probably longer in the US than in Europe, but most managers and sales managers get some variable compensation based on performance. For example, Olivier, general manager of a company-owned hotel in France, explains that “All personnel get rewarded on a fixed annual pay plus a relatively small variable pay based on objectives. The objective for our hotel includes multiple items such as the score on a quality survey, gross profits, and regional gross profits.” Regional gross profits includes the profits of other hotels that are located in the same region, which may be of the same or another brand that belongs to the same hotel corporation. Nicolas, Vice President of the same hotel corporation, describes the systems precisely: “The general manager of one of our hotels receives a fixed salary plus 15% if the GOP (gross operating profit) budget is achieved, plus 15% if the GOP budget is significantly surpassed, plus 15% based on the total sales of the region, plus 15% based on general quality items. Department managers get a fixed salary plus a 15% bonus based both on the GOP of the hotel, and specific quality, management, or sales target. Other employees may receive a bonus based on GOP, and a 6% bonus based on two or three personal objectives.”

Charlotte, the general manager of an independent hotel in France describes their compensation system as follows: “The owner periodically decides to give a bonus (between 500 euro and one complete monthly salary), based on exceptional performance. The bonus could be linked to high revenues, high occupancy (e.g., 94% in September last year, while maintaining a good price level), low costs, quality, etc. The bonus is highly subjective.”

The situation in the US is relatively similar. Matthew, sales manager of a US company-owned hotel, tells us “My bonus is based on (1) gross operating profits,

(2) customer satisfaction, (3) market share, and (4) the “flow through” (i.e., gross operating profits per dollar revenue).”

4.5.5. Commitment in Multiunit Organizations

How do managers of company-owned units differ from owners of franchised units? How do the incentives differ between managers of company-owned units and franchisees? Does the mindset differ between CO and FR managers?

Franchisees face different constraints than managers of company-owned units. Matthew, sales manager of a company-owned hotel, argues “Franchisees are more involved in day-to-day decision making. If there is a tough month, they may be more aggressive, because they need business to pay the bills. Management of company-owned hotels is more decoupled.” Ben, senior VP Franchising of a hotel corporation, provides another reason why the incentives of franchisees differ from those of the managers of company-owned units: “Franchisees are more short-term focused because they can exit the brand, either by selling or by repositioning the establishment. We are committed to our brand, because we have not exit strategy.” Paul, VP Pricing of the same company, adds: “Franchisees are short-term oriented, eager to increase when demand is strong, and willing to decrease when demand is weak.” Franchisees will probably not agree that they are short-term oriented. For example, John, the owner of three franchised hotels, explains “Our business is derived mainly from conventions, which means that contracts dominate transient business. We therefore have to have a long-term time horizon of 3-5 years.”

Most interviewees agree that company-owned hotels have a longer time horizon franchised or independent hotels. One interviewer, however, argued that company-owned hotels are under more time pressure: “When markets are down (low demand and occupancy), privately owned and operated hotels may decide to maintain their pricing structure to wait and see when the market will pick up again. The shareholders of the large hotel operators, however, put pressure on management to gain market share even if markets are down. Thus, they effectively force managers to lower their price. The likelihood to engage into a price war is thus larger for company-owned

establishments than for independent properties.” (Jack, area manager).

The risk profile of the owner of a typically small franchised hotel is most probably different from the risk profile of a large hotel corporation. “An investor could take risks that an individual would not be willing to take. We can take more risks: it is not our money.” (Matthew, sales manager company-owned hotel)

Do the pricing policies, discount practices, etc. differ depending on whether the hotel is company-owned or franchised? Are there other differences between CO and FR units in terms of customer segments, costs, management practices, or quality levels?

Most interviewees agree that prices at company-owned hotels are more stable than prices at franchised hotels, although different explanations are being offered. Paul, VP Pricing of a hotel corporation, argues “Because franchisees have a shorter time horizon, their prices fluctuate more, depending on demand. We believe that it is better to be consistent, to ask a fair price for the quality you offer.” Paul adds, “Sometimes franchisees will charge too much, which is bad for the brand. Also, franchisees sometimes give too much discounts. Discounting is like a drug: it is very difficult to brake the habit.” Chris, revenue manager, concurs: “Franchisees react more violently to economic swings.” Franchisees seem to agree with this viewpoint. John, owner of three franchised hotels, argues “If you are not full and you have a low cost structure, you can go low to attract more customers.”

Another reason for price consistency could be the top down fashion in which pricing is implemented at corporations with company-owned units, which creates a certain rigidity in itself. Paul, VP Pricing, states that “Pricing is clearly top down. Therefore, there is more consistency and rigidity than in franchise pricing.”

Jack, area manager, does not see a difference in the behavior between company-owned and franchised units. “How individuals evaluate the market depends on their personal market feeling. In principle, all these managers face the same market and the same decisions. If one of our managers makes poor pricing decisions, he gets fired. If the owner of a franchised property makes poor pricing decisions, he gets bankrupt.”

Nicolas, VP of a hotel corporation, discusses the changes that occur if an independent hotel becomes franchised. He argues that the percentage GOP of an independent hotel is quite similar to the percentage GOP of a franchised hotel. The main difference is that the turnover increases due to the franchise (“the turnover of an independent hotel is 20% less than turnover of a franchised hotel”). This is not primarily due to a higher occupancy rate, but mostly to a higher average room rate. Independent hotels generally price lower, too low according to Nicolas. Independent hotels are not aware of national/international trends. For example, independents will be very reluctant to increase the price significantly during a world cup or other event. Nicolas: “The result is that franchised hotels and company-owned hotels may have up to 50% higher rates, and still attain 100% occupancy.”

Company-owned and franchised units differ in other perspectives, such as size. “Franchised units are typically much smaller than company-owned units.” (Ben, senior VP Franchising). The reason for this difference is that hotel corporations generally prefer to manage the larger establishments within the same brand themselves, because of the complexity.

Interviewees make different arguments for why the costs of either franchised or company-owned units are higher. Ben, senior VP Franchising, argues that franchised units may have higher costs than company-owned units: “Franchisees may provide extra amenities to the customers in an aim to be customer friendly. This could drive up costs and prices, which always decreases profitability.” Chris, revenue manager, takes the opposite stand: “Franchised units may have less costs because they are less well maintained.” Nicolas, VP of a European hotel corporation, describes the effect on the cost structure of changing ownership form from independent to franchised: “The discretionary cost structure of independent, franchised, and company-owned hotels is relatively similar. A franchised hotel will decrease its costs related to branding, promotions, sales, and advertising. Also, due to shared purchases, the costs of amenities may slightly decrease. At the same time, the franchised hotel will increase some costs that are related to the quality of the hotel, directly affecting the brand image. Compared to a company-owned hotel, an independent hotel may save

some money by using (unpaid) family members etc.”

Finally, Jack described how customer satisfaction dropped when an establishment changed from being company-owned to franchised. “Why did the satisfaction drop? New management is not familiar with the procedures that are part of the brand. Moreover, employee morale fell. The new owner has fired some of the overhead employees and other personnel feared to be fired next. In the past 16 months, the hotel has had 4 different general managers.”

Does it happen that a specific establishment plays the role of price leader? What is the effect of that on competition and performance? Is it more feasible for a manager of a CO unit to commit to setting a high price than for a franchisee or for the owner of an independent hotel?

There was widespread agreement that price increases could lead to higher profits. Some interviewees referred in this respect to a recent article by Professor Enz, who was also interviewed (Enz, Canina, and Lomanno, 2004). It should be noted that not only explicit collusion, which is illegal, could achieve this; also, tacit or implicit collusion, for example resulting from repeated interaction, could lead to cooperative behavior. Although many interviewees agreed that collectively raising prices would increase profits, most did not see this happen in reality. Paul, VP Pricing, complains: “It is not sure that competitors will follow if you raise your price. People don’t play fair. Competition is as uncontrollable as the weather.” Matthew, sales manager, agrees: “Collusion and price setting doesn’t work. Someone will always renege. There is no commitment.” Paul, VP Pricing, sees the same problem: “It is difficult to commit to being a price leader, because eventually somebody will always undercut you.” However, Paul adds that price leadership is more likely in an economic upturn situation than in a downturn market.

Nicolas, Vice President, was more positive about the possibility that an establishment plays the price leader role. Nicolas suggested even that in a market where a number of independent and franchised hotels compete fiercely prices could increase following the entry of one more – company-owned – hotel. “After entry, we set a relatively high price and show that the market can bear the higher price. Often, but

not always, our competitors pick this up and increase their prices, too.” This suggests that this company is able to credibly commit to a high price, which has a positive effect on the rivals due to the strategic complementarity of the industry. Nicolas explains that “We know what a typical hotel, depending on its size and brand, should do in terms of prices, occupancy, and costs. If a hotel is not successful, it is decided whether to close or rebrand the hotel.” Apparently, lowering the price to attract additional customers is not considered a feasible option.

When does a hotel corporation choose for company-ownership and when for franchising a particular establishment?

Different reasons have been given to decide whether to own or to franchise. Size has been mentioned before: “Larger hotels are preferably company-owned, because the management of large hotels becomes very complex. Big hotels, with more than 200 rooms are only managed by us.” (Nicolas) Another criterion seems to be the market potential. Paul, VP Pricing, explains: “We often use franchising in secondary or tertiary markets as a supplement to our primary markets, where we have company-owned units. It is easier to expand in less successful markets through franchising.”

When one looks at this question from the perspective from an individual establishment, the following establishment life cycle has been suggested: “The normal life cycle of a property is as follows: starts independent, becomes a franchise, and then become a company-owned property.” (Stephan, room manager). One may add that this seems to focus on the first part of the life cycle. Older hotels could become franchised hotels of a lower segment, and possibly even independent hotels at a certain point in time.

Ben, senior VP Franchising, argues that it is valuable to have both company-owned and franchised units in a chain: “A rival hotel corporation only has franchised units. The corporation was more interested in just maximizing revenues, rather than building a brand. Now, these brands have lost their good reputation.”

Finally, a franchisee explains how typically a franchise is granted to a franchisee. “The franchisee acquires the location and then submits a plan of intent and the

franchisor then decides if it is suitable and gives the ok. Remember, the franchisee is taking all the risks. The franchisor gets a contract signed with all bindings and then comes out ahead. The franchiser allows the franchisee to build or renovate a property. They then ask that you abide by all rules and quality standards. If the franchisee does not do this, he will be revoked and the name taken away. So the franchiser is always ahead of the franchisee.” (Raj, the owner of a franchised hotel)

4.5.6. Conclusion

The interviews that have been summarized in this section have added value to this dissertation by testing some of the assumptions that underlie the theoretical framework used, by refine the understanding of the specific practices and circumstances of the hotel industry, and by verifying the face validity of the theoretical development described in this dissertation. On many topics, there seemed to be agreement among most industry experts. For example, most interviewees agreed that while collectively raising prices would increase firm profits, this is very difficult to realize in daily practice. Putting explicit collusion aside, the repeated interaction apparently does not lead to tacit collusion. Most probably, this could be explained by a lack of *common knowledge*. Although everybody may agree that raising prices would benefit all, each individual manager may not *know that everybody knows*: “Someone will always renege.” At the same time, mechanisms seem to be in place to avoid excessive rivalry. Internal processes and procedures in combination with industrial norms and values seem to dampen rivalry. Examples that confirm this argument are the use of costs that are higher than marginal costs as a basis for pricing decisions and the frequent mention that firms should not automatically follow a rival’s price decrease.

Most interviewees also agree that the incentives and mindsets of franchisees are different from those of managers of company-owned establishments. While some industry participants believe that these differences “should” not affect managerial behavior, most industry experts agree that incentives ultimately influence behavior, which means that company-owned units may compete differently from franchised

units. Our core argument that company-owned hotels are better able to commit to playing the price leadership role is confirmed by some of our informants, although it must be stated that other informants find it difficult to develop a coherent argument about this topic. It seems that industry participants generally find it difficult to link ownership forms, managerial incentives, and competitive behavior, which is not surprising given the novelty of this topic.

From the interviews, it has become clear that hotel corporations use different methods to influence managerial behavior. These methods could be characterized as either relying on financial incentives, rewarding specific outcomes, or relying on procedures and control processes that directly influence behavior through fiat. Examples of the first mechanism are bonuses on market share or gross operating profits, while examples of the second include sales meetings and generally accepted practices. From the interviews, it seems that the second mechanism is more important in its influence on managerial behavior than the first, both in the European and American context. The following quote confirms this assertion: “Local management is closely monitored.”

4.6. Statistical Analysis

4.6.1. Sample

The empirical setting of this study is the hotel industry. The hotel industry is characterized by local competition, i.e., hotels compete directly with establishments that are located in the same area, but not with hotels that are located in a completely different part of the country or state (Baum and Mezias, 1992). Hotel services are differentiated goods that differ both in terms of their quality and their location. We focused on the short-run competitive interaction between hotel establishments, where the capacity of each hotel is taken as given, and competition therefore takes place in terms of quality and price.

Several studies have considered the benefits and drawbacks of chain organization in the hotel industry. For example, Ingram and Baum (1997), Chung and Kalnins (2001), and Canina, Enz, and Harrison (Forthcoming) explored agglomer-

ation spillovers in hotel chains. Ingram (1996) argued that chain organization can solve the problem of commitment to quality. Other studies have explored the difference in behavior between company-owned and franchised units. Conlin (2003), for example, showed that competition between franchised units is fiercer than between company-owned units, because franchisees do not consider how their pricing behavior affects demand of other units. Kalnins (2003) showed that the entry of franchised units in a market decreases the revenues of the incumbent hotels of the same chain, while the entry of company-owned units increases revenues of incumbents.

The data we used was from the Texas hotel industry. Because of the large size of the Texas market, the heterogeneity of the state in terms of rural and urban regions, and the availability of reliable data, the Texas hotel market is well suited for empirical research. The two primary sources of data we used are a hotel tax file we obtained from the State of Texas Comptroller's Office and the Source Strategy Inc. database. The former database has been used among others by Chung and Kalnins (2001). The latter database has been used in previous studies such as Conlin and Kadiyali (2002) and Conlin (2003).²⁸

All hotels in Texas with room revenues exceeding \$16,300 per quarter are required to report revenues on a quarterly basis to the State of Texas Comptroller's Office. The Comptroller's Office makes this data publicly available. This dataset included the hotel name, the location of the hotel, the name and address of the owner, the number of rooms available, and the quarterly revenues. The Source Strategy Inc. database included the same hotels and reports with the same periodicity. The data comprised the name of the hotel, the brand name if the hotel belonged to a chain, its location (town and zip code), the average quarterly occupancy rate, price, and revenue per available room.²⁹ The final dataset spanned 24 quarters (1997 through

²⁸Conlin (2003) studies how ownership affects competition between two establishments of the same brand. Because chains with company-owned units maximize joint profits, while franchisees maximize the profits of their single unit, company-owned units are expected to compete less aggressively with other company-owned units of the same brand, than franchised units with other franchised units of the same brand. This study is not focused on competition between units of the same brand, but on competition between units independent of their brand.

²⁹The average room price (average daily rate), the occupancy rate, and the average revenue per available room are the three most commonly used performance indicators in the hotel industry. The

2002) and contained 77,257 observations. This dataset provides unique research opportunities because it contains fine-grained longitudinal competition data as well as detailed data at the establishment level.

We defined the local market as the zip code area in which a focal hotel is situated. This is in line with Chung and Kalnins (2001) in a study of the Texas hotel industry. In Texas, approximately 3,500 hotel establishments compete in more than 800 local markets. During the time period of our sample, 1997-2002, the number of hotels in Texas grew by 5 percent annually. Franchising grew from 30 to 34 percent by the end of 2002. The number of company-owned units grew slightly, from 13 to 15 percent. Independent hotels formed 57 percent in 1997, and 51 percent in 2002. The number of hotels per zip code in our sample ranged from 1 to 54. The number of markets in which only one establishment operated (monopoly markets) equaled 2 percent. In 57 percent of the markets, between 2 and 10 hotels operated. In 41 percent of the markets, more than 10 properties were present.

We limited our analysis to hotels that belonged to a chain (company-owned and franchised hotels). This reduced our sample to 36,668 observations. Comparing chains, consisting of company-owned and franchised hotels, with independent hotels is difficult because of the importance of the brand reputation that the chains have built. Moreover, while quality data for chains were publicly available, the same data were not available for independent hotels, which would have made it even more difficult to compare chains with independents.³⁰ Obviously, market measures, such as the average occupancy rate or the market concentration, included all hotels in the market.

We used brand dummies, rather than segment dummies, because within-segment, across-brand differences are significant in the hotel industry. For example, a large business hotel such as Westin is in many respects different from a niche hotel such as Four Seasons, even if both are in the luxury segment. Each brand belongs to only

relationship between these three measures is as follows: revenue per available room = occupancy \times average room price.

³⁰Some hotel tour books, such as the one published by the American Automobile Association, report a “star” rating, but these turn out to cover only 15 percent, or less, of the hotels in Texas (Chung & Kalnins, 2001).

one segment.

Some brands chose to have only company-owned or franchised units. In these cases, it was impossible to distinguish between the brand effect and the ownership effect. To be able to distinguish brand effects from ownership effects, we therefore limited our analysis to those brands that contained both franchised and company-owned units. This reduced our sample to 12,144 observations. Out of the 82 hotel brands that were in business in Texas, 28 brands operated both franchised and company-owned hotels.³¹ Controlling for brand and limiting our focus on those that had both franchised and company-owned units allowed us to identify the effect of ownership form changes within the same brand. Appendix D contains a list of the included brands, including information about the market segment, the average price per room, the percentage company-owned and franchised, the royalty fee, and the number of units in Texas. Appendix E shows examples of company-owned and franchised hotels of the same brand.

4.6.2. Dependent Variable

Price per room per night. The dependent variable was the average price for a hotel room. We used the natural log of the price, because price followed an approximate lognormal distribution. This variable was inversely related to our main concept of interest, the intensity of rivalry. The price measure was an average for each hotel establishment for each period. In reality, the price per night in a hotel room usually fluctuates according to the length of the stay, the size of the room, the day of the week, or the season. Because our variable was average per three-month period, it did not capture these price differences. We do not believe that this data limitation systematically biased our findings.

³¹We defined a brand as belonging to this category if at least 5 percent of its units are franchised and at least 5 percent are company-owned.

4.6.3. Independent Variables

Ownership form. The main independent variable was ownership form. We created a dummy variable for franchised establishments (1 if franchised, 0 if not franchised). The company-owned ownership form was the omitted variable. We determined whether a unit was franchised or company-owned in a certain quarter, based on the brand name, the owner address, and information from the Directory of Hotel and Lodging Companies (2003).³²

Market concentration. The most common used measure of market concentration is the Herfindahl index, which is defined as the sum of the squared shares of the participants in a given market. We calculated the Herfindahl index based on the capacity share (number of rooms) of all firms in the market, including the focal firm.

Royalty fees. The Hotel and Motel Magazine annually published a Franchising Supplement (1997-2002), which included detailed information about the franchising fees per brand. We included a variable royalty fee, which indicated the royalty fee per brand as a percentage of revenues. Franchise fees were relatively stable during the period of observation (Lafontaine and Shaw, 1999). Moreover, changes in the fees were reflected only in the new contracts that were signed after the change took place. We therefore included average franchise fees per brand over the six-year time period.

Control variables. Because our data is a panel of multiple hotels from multiple chains, observed across multiple markets, at multiple periods, we used fixed effects to control for sources of heterogeneity that we could not explicitly observe. First, we included dummy variables for each period (year and quarter) to control for unobserved seasonal and macroeconomic trends in the Texas economy. Second, we included fixed effect dummies for the brands in the sample. These dummies controlled for the average quality, reputation, and hotel profile of hotels within a

³²The Directory of Hotel & Lodging Companies provides the address (town and state) where the chain is situated. All hotels, whose owner is located in that town, are assumed to be company-owned. All other chain hotels are assumed to be franchised.

given brand. Our use of brand dummies provides a superior control for unobserved differences than previously used quality segment dummies. The brand dummy was based on the brand name for each establishment/period combination as reported in the Strategy Source Inc. database. We cross-checked the brand code with the hotel name reported by the Comptroller's Office. Finally, we included fixed effect dummies for each physical establishment. These dummies accounted for the differences in hotel location and stable hotel characteristics, such as hotel size.

Establishment dummies were also helpful to account for potential endogeneity of ownership form. It is possible that chains select ownership forms based on characteristics of the establishment or location. If that is the case, the estimates of ownership form might suffer from self-selection bias (Hamilton and Nickerson, 2003). Self-selection bias would result if unobservable characteristics that were relevant in the choice of ownership form also influenced the competitive behavior of the establishment. Statistically, that bias would be reflected on a correlation between unobservable establishment characteristics and the ownership form variable. The self-selection problem can be addressed by examining the Hausman test associated with the fixed establishment effects, because the Hausman statistic explicitly tests whether the observed variables are correlated with the unobserved sources of heterogeneity.

In addition to the above fixed effects, we controlled for time-varying conditions of supply and demand affecting each particular establishment. To control for supply variations, we included the logarithm of market capacity, defined as the total number of rooms of all establishments in the market. To control for market-specific demand shocks, we included the mean occupancy rate in the local market, defined as the percentage of occupied rooms by the establishments in the market, excluding the focal firm. This exclusion was necessary to avoid potential endogeneity, because the firm's own occupancy might be influenced by its price.

4.6.4. Estimation

Our model consisted of a reduced-form price equation for each establishment, and was estimated using a panel regression. The functional form can be written as:

$$\log(\text{price})_{it} = \mathbf{x}_{it}\boldsymbol{\beta} + \mathbf{Z}_{it}\boldsymbol{\gamma} + \alpha_i + \theta_{c(i)} + \tau_t + \epsilon_{it},$$

where \mathbf{x}_{it} are the independent variables of interest, \mathbf{Z}_{it} are the control variables, α_i are the establishment fixed effects, $\theta_{c(i)}$ are the brand effects, and τ_t are the period effects.

4.6.5. Results

The final sample constituted an unbalanced panel of 630 establishments (either company-owned or franchised) observed over a maximum of 24 periods, totaling 12,069 observations. There were 6,106 observations of franchised hotels, and 5,963 observations of company-owned hotels. We compared the variables for these groups using univariate t-tests between the two groups. The univariate comparisons showed that franchised hotels tended to have higher prices and revenue per available room. Franchised hotels operated in markets with slightly lower average capacity, and in markets where their rivals tended to have higher mean occupancy, but the ownership forms did not differ in the average concentration in their markets. Table 4.1 presents descriptive statistics, including means and both the overall and the within-establishment standard deviations and correlations.

Variable	Mean	Std. Dev.		Min	Max	Correlations						
		overall	within			(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) In(Price)	4.14	.41	.08	3.01	5.33		.62	-.01	-.09	.01	.20	.08
(2) In(RevPar)	3.68	.50	.20	1.44	5.00	.91		.01	.03	.02	.41	-.08
(3) Ownership form (Franchise)	.51	.50	.16	.00	1.00	.27	.22		.00	-.08	.03	-.01
(4) Market Concentration	.02	.17	.05	-.16	.80	-.19	-.17	-.01		.04	-.28	-.71
(5) Franchise * Royalty Fee	.00	.39	.08	-1.56	.86	.07	.06	.00	-.06		-.02	-.01
(6) Mean Occupancy in Market	.58	.13	.08	.00	.90	.25	.34	.03	-.49	.02		-.04
(7) In (Market Capacity)	6.87	.91	.14	3.56	9.01	.44	.38	-.03	-.75	.11	.35	

Table 4.1 Descriptive statistics.

To avoid multicollinearity between main effects and interaction effects, and to facilitate interpretation, the interacting variables (market concentration, royalty fee)

were centered on their respective means (.19 and 4.56 percent, respectively) (Aiken and West, 1991). The Pearson correlations confirmed that franchised establishments charged higher prices. Price was positively correlated to market capacity and market occupancy, and negatively to market concentration. However, these bivariate correlations were not particularly indicative of actual effects, given the significant correlations between multiple variables and the effects of unobserved heterogeneity.

Table 4.2 presents the results of our analysis. Because ownership form is a policy variable, we were concerned that it would systematically correlate with characteristics of the chain, the market, or the establishment. Accordingly, before testing our hypotheses, we examined whether the effect of ownership form on pricing behavior was robust to the inclusion of several fixed effects. Models 1, 2, and 3 examine the effect of ownership form on pricing after controlling for relevant observed and unobserved effects. The effect of franchise on price was positive and significant when only controlling for market occupancy, market supply, and period effects. Yet, the variable turned negative and significant when controlling for brand fixed effects. This result indicates that some hotel chains that were more prone to franchising were also more likely to charge higher prices. Examination of Appendix D corroborates that, at least in the Texas hotel industry, large chains in the economy segment were more likely to rely on company-owned establishments (e.g., Motel 6, Red Roof Inn, Studio 6), while some large chains in the upscale and luxury segments were more likely to use franchised establishments (e.g., Doubletree, Sheraton).

Table 4.2 Regression Results ^a

Model	1	2	3	4	5	6
Dependent Variable	ln(Price)	ln(Price)	ln(Price)	ln(Price)	ln(Price)	ln(Price)
Sample	All	All	All	All	All	All
Market Definition	ZIP Code	ZIP Code	ZIP Code	ZIP Code	ZIP Code	ZIP Code
Ownership form (Franchise)	.22 *** (.01)	-.02 *** (.00)	-.01 + (.00)	-.01 (.00)	-.01 (.00)	.00 (.00)
Market Concentration				.20 *** (.02)	.19 *** (.02)	.18 *** (.02)
Franchise*Market Concentration				-.10 *** (.02)	-.08 *** (.02)	-.07 ** (.02)
Franchise*Royalty Fee					.03 *** (.01)	.03 *** (.01)
Franchise*Royalty Fee*Market Concentration						.11 *** (.03)
Mean Occupancy in Market	.29 *** (.03)	.12 *** (.01)	.15 *** (.01)	.19 *** (.01)	.19 *** (.01)	.19 *** (.01)
ln (Market Capacity)	.18 *** (.00)	.07 *** (.00)	-.05 *** (.01)	-.01 + (.01)	-.01 * (.01)	-.02 * (.01)
Constant	2.5554 (0.0296)	3.7401 (0.0261)	4.3598 (0.0390)	4.0719 (0.0553)	4.0886 (0.0555)	4.1037 (0.0556)
Fixed Effects:						
Period Effects	YES	YES	YES	YES	YES	YES
Brand Fixed Effects	NO	YES	YES	YES	YES	YES
Establishment Fixed Effects	NO	NO	YES	YES	YES	YES
Observations	12 069	12 069	12 069	12 069	12 069	12 069
Establishments	630	630	630	630	630	630
TSS	1 983	1 983	1 983	1 983	1 983	1 983
RSS	1 419	322	59	59	58	58
R ²	.2841	.8375	.9703	.9705	.9705	.9705
R ² (within)			.2492	.2537	.2546	.2553
RMSE	.3433	.1637	.0719	.0717	.0716	.0716
Log-Likelihood	-4 209	4 740	14 993	15 030	15 037	15 043
Log-Likelihood (null)	-6 226	-6 226	13 264	13 264	13 264	13 264
F-value	183.80 ***	1168.61 ***	108.15 ***	104.78 ***	102.47 ***	100.22 ***
Degrees of freedom	(26, 12042)	(53, 12015)	(35, 11404)	(37, 11402)	(38, 11401)	(39, 11400)
R ² (within)			.2492	.2537	.2546	.2553
Lagrange multiplier test			76 838 ***			74106 ***
Hausman Test			222.53 ***			2041.77 ***

^a †: $p < .1$, *: $p < .05$, **: $p < .01$, ***: $p < .001$.

Model 3 includes fixed effects for establishments, and the relationship between franchise form and pricing remained negative, but only weakly significant. Longitudinal changes in ownership form for a specific establishment were a necessary condition to ensure statistical power for the estimation of ownership effects in the fixed effects model. Over the six years of observation, 15.8 percent of the establishments in our sample changed ownership form, which means that they moved from being franchised to being company-owned, or vice versa. Therefore, we inferred that the marginal statistical significance was not due to problems of statistical power. The results suggest that the strongly significant negative effects found in model 2 might be due to unobserved differences between properties. It appears that, within a given chain, franchised units were associated with unobserved establishment characteristics (mainly about the property itself or its surrounding market) that explained their lower price. Chains might retain as company-owned establishments either the more expensive properties or those properties with the most attractive market locations. This interpretation was confirmed by industry executives, who reported that chains prefer to own the larger, more luxurious properties of a brand because of the complexity of managing these properties. The rejection of the null hypothesis in the Hausman test confirmed that sources of unobserved heterogeneity were correlated with the observed variables in the model. We interpreted these results as consistent with self-selection in the choice of ownership form.

Models 4 to 6 include the test of the hypotheses. Hypothesis 4.1 suggests that company-owned units increase their prices more than franchised-units when market concentration increases. Model 4 includes the effects of market concentration, and the interaction of market concentration with franchise form. Because company-owned properties were the omitted category, the results indicated a positive effect of market concentration on log-prices of company-owned facilities (slope: .20, $p < .001$). For franchised units, the effect was determined by the sum of the coefficients (slope: $.20 + (-.10) = .10$, $p < .001$). The interaction term represented the difference between the concentration-price slopes for company-owned and franchised establishments. The difference is negative and statistically significant ($-.10$,

$p < .001$), in support of Hypothesis 4.1. The evidence suggests that company-owned units were more likely to raise prices than franchised units when market concentration increased and strategic interactions became most salient. Figure 4.2 depicts the relationship between concentration and price for company-owned and franchised units.

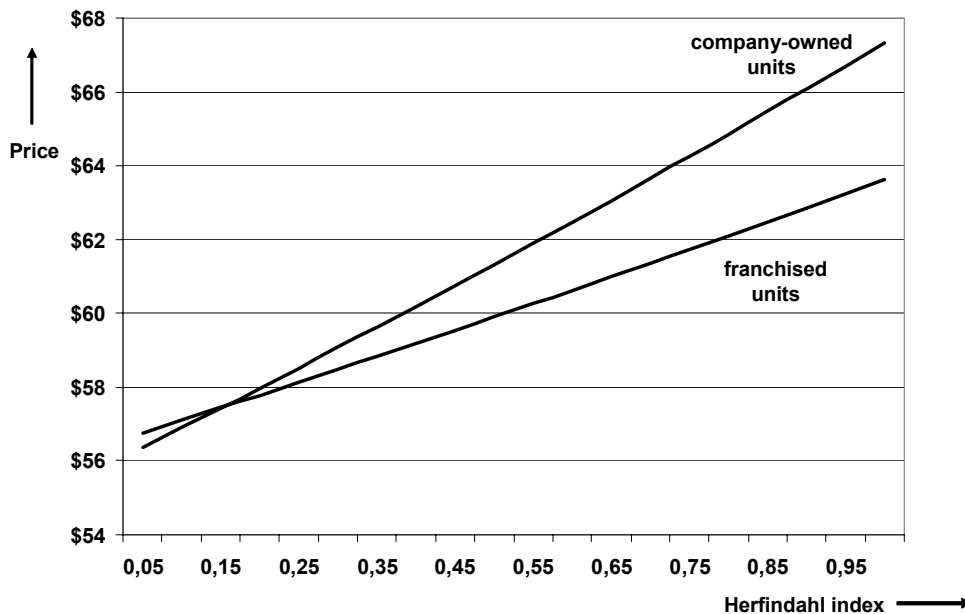


Figure 4.2 Price difference increases as concentration increases.

Hypothesis 4.2a suggests that higher royalty fees to franchised units would be passed on to customers in the form of higher prices, as expected by double marginalization arguments. Model 5 adds a variable for royalties. The variable was centered on the mean of 4.56 percent for franchised units, and was set to 0 for company-owned establishments. The coefficient on the royalty fee was equal to .03 ($p < .001$), which suggests that a 1 percent point increase in the royalty is associated with a 3.1 percent increase in the price charged to customers.³³ The results confirm Hypothesis 4.2a.

The insignificance of the franchise dummy in model 5 suggests that franchised and company-owned units did not price differently at the average level of the royalty

³³This percentage is calculated as follows: $e^{.0313} - 1 = 3.1\%$.

fee (4.56 percent). The royalty fees ranged from 3 to 5.4 percent in the sample (1.56 below the mean to .86 above the mean), and the predicted price effects therefore ranged from 4.7 percent below the mean to 2.7 percent above. Extrapolating the results outside the range of data suggests that an imaginary franchised hotel with 0 percent royalty fee would price 14.7 percent below a comparable company-owned hotel.³⁴ Therefore, the distortion of price associated with royalty fee is important, even though the mean levels tend to equalize.

Finally, Hypothesis 4.2b suggests that the franchisor’s ability to pass on increases of royalty fees to customers was limited in more competitive markets. The positive interaction in model 6 between the royalty fee and market concentration (.11, $p < .001$) confirmed the hypothesis. The sensitivity of prices to royalty fees is plotted in Figure 4.3 for firms at different concentration levels. As the market becomes more competitive, passing the royalty fee on to customers becomes less feasible. In higher concentration markets, however, higher royalty fees result in even higher customer prices.

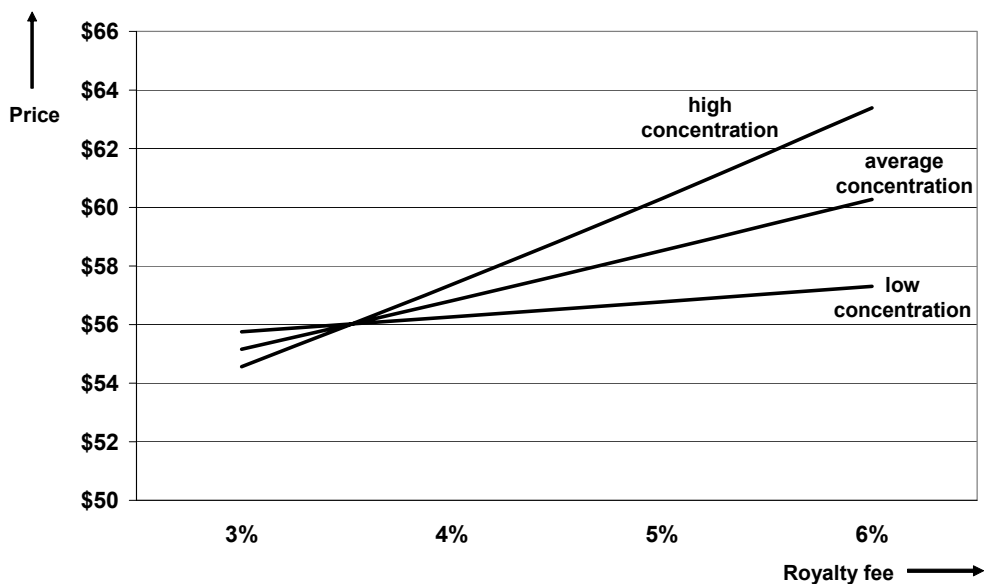


Figure 4.3 Price as a function of royalty fee at different levels of concentration.

³⁴ $e^{-.0050-4.56*.0313} - 1 = 14.7\%$.

4.7. Discussion and Conclusion

While traditional research in competitive strategy treats the firm as if it consists of a unitary actor, in this dissertation, we explore how the inside of the firm affects the way it competes *vis-à-vis* its competitors. We have developed arguments that link ownership forms with managerial incentives and competitive behavior. The results are generally supportive of our hypotheses. We find that company-owned hotels are better able to adjust their pricing to the competitive conditions, and may serve as price leaders in more concentrated markets. Strategic incentive theory suggests that such price leadership behavior would be effective in encouraging competitors to follow with higher prices. Influencing competitive decision-making after delegation to franchisees is more difficult, because chains do not have direct control over the end-consumer price. Franchisors are prohibited by antitrust regulation to directly influence franchisees' competitive decisions. While royalty fees may be used to indirectly affect pricing, this mechanism is shown to be limited because it cannot be adjusted to local competitive circumstances. Franchisors cannot discriminate among franchisees with royalty fees. While increasing royalty fees could benefit the chain in markets with high concentration, in more competitive markets increased fees would hurt the franchisee, because the increase in costs could not be passed on to customers. This condition would limit franchisors' ability to use royalty fees as a competitive commitment mechanism.

We carried out several robustness checks for the empirical model (Models 7, 8, and 9 in Table 4.3). First, we examined whether the differential price effect of company-owned and franchised units was due to monopolistic or oligopolistic pricing. Theory suggests that the credibility of strategic incentives should be particularly important in oligopolistic contexts because in these situations the strategic interaction is most salient. Because of their *ex post* rigidity in pricing policies, company-owned units are able to credibly commit to price leadership, while franchised units may not. Raising prices in monopoly situations does not require competitive credibility, since it does not involve competitive interactions. Model 7 presents the results for the analysis using a restricted sample that eliminates cases where establishments

were the only hotel in the ZIP-code market. The predicted slopes of market concentration on the log of price were .12 and .00 for company-owned and franchised units, respectively. By eliminating monopoly markets, the slopes of both ownership forms are smaller than in the main model (Model 6), as would be expected by the restriction of range in the independent variable. However, the difference of the slopes is now greater than in the main model, and the slope of the franchised units becomes insignificant. This result underscores the inability of franchised units to raise prices under oligopolistic conditions.

Next, we explored the robustness of our geographical market definition by using a distance-based definition of the market. We geocoded the address of each hotel using web-based EZLocate geocoding services. We then defined the relevant market by the establishments within a radius of two miles from the focal unit. The average number of establishments within a two-mile radius market was approximately equal to that within a ZIP-code market. The results (Model 8) with this market definition were largely consistent with those of the previous model. The difference of slope between ownership forms remained significant. The royalty fee maintained a significant effect on price. However, the royalty fee effect on pricing appeared to be unrelated to market concentration. In general, the slopes of concentration and price were higher than in previous models.

Table 4.3 Additional Regression Results ^a

Model	6	7	8	9
Dependent Variable	log (Price)	log (Price)	log (Price)	log (RevPar)
Sample	All	Monopoly hotels excluded	Monopoly hotels excluded	Monopoly hotels excluded
Market Definition	ZIP Code	ZIP Code	2-mile radius	ZIP Code
Ownership form (Franchise)	.00 (.00)	.00 (.00)	.00 (.00)	.01 (.01)
Market Concentration	.18 *** (.02)	.12 *** (.03)	.41 *** (.07)	.65 *** (.07)
Franchise*Market Concentration	-.07 ** (.02)	-.12 *** (.03)	-.26 *** (.06)	-.20 *** (.06)
Franchise*Royalty Fee	.03 *** (.01)	.03 ** (.01)	.02 * (.01)	.03 (.02)
Franchise*Royalty Fee*Market Concentration	.11 *** (.03)	.09 * (.04)	.03 (.09)	.66 *** (.09)
CO: Concentration => log (price)	.18	.12	.41	.65
FR: Concentration => log (price)	.11	.00	.15	.45
Fixed Effects:				
Period Effects	YES	YES	YES	YES
Brand Fixed Effects	YES	YES	YES	YES
Establishment Fixed Effects	YES	YES	YES	YES
Observations	12 069	11 808	11 721	11 808
Establishments	630	619	615	619
TSS	1 983	1 934	1 902	2 892
RSS	58	57	55	322
R ²	.9705	.9707	.9710	.8887
R ² (within)	.2553	.2630	.2789	.2900
RMSE	.0716	.0713	.0706	.1700
Log-Likelihood	15 043	14 762	14 776	4 510
Log-Likelihood (null)	13 264	12 960	12 860	2 488
F-value	100.22 ***	102.00 ***	109.75 ***	116.76 ***
Degrees of freedom	39, 11400)	(39, 11150)	(39, 11067)	(39, 11150)
R ² (within)	.2553	.2630	.2789	.2900
Lagrange multiplier test	74106 ***			
Hausman Test	2041.77 ***			

^a †: $p < .1$, *: $p < .05$, **: $p < .01$, ***: $p < .001$.

Our interpretation of the results has been that company-owned units actually benefited from increasing prices in the presence of high concentration. A price equation by itself is not sufficient to substantiate the performance effect of the observed competitive behavior. It is possible that company-owned units that raise prices in more concentrated markets may actually lose occupancy and revenues. An additional way to triangulate our intuition is to use a measure of revenue per available room, since revenue per available room is affected by both price and occupancy. An increase in price that results in a significant decrease in occupancy may lead to a reduction of the revenue per available room. This is why revenue per available room is used frequently by industry participants as a summary indicator of hotel performance. Model 9 shows the results of an analysis where revenue per available room is the dependent variable in a sample that excludes monopoly observations. The result indicates that company-owned units obtain higher revenues per available room in more concentrated markets than franchised units. This finding suggests that price increases by company-owned units indeed lead to increased performance. Interestingly, franchised units also benefited – albeit to a lesser extent than company-owned units – from higher performance in concentrated markets, even though they did not appear to raise prices (Model 7). This positive performance effect might be explained by an increase in occupancy due to company-owned units increasing prices in markets where franchised units competed with company-owned establishments.

With this chapter, we aim to contribute both to the theoretical and empirical literatures that explore the relationship between firm characteristics, incentives, and interfirm rivalry. While there has been ample theoretical treatment of strategic incentives theory, the empirical evidence of this theory has been scant. Two notable exceptions are Slade (1998b) and Aggarwal and Samwick (1999). Slade finds that the likelihood of vertical separation in gasoline stations increases as the benefit of separation through strategic delegation increases. Aggarwal and Samwick find in a cross-sectional study of companies that are listed on a stock exchange that the weight placed on rivals in the executive compensation scheme decreases as concentration increases. This finding is interpreted as evidence for strategic incentives theory. In

this study, we show that chains may provide company-owned units with incentives to soften competition, confirming strategic incentives theory. With this analysis, we hope to improve the balance between theoretical and empirical contributions of strategic incentives theory.

One way to understand our results is to compare them with the following metaphor. In the well-known legend, Ulysses sailed the seas with his sailors. When they approached the Sirens, Ulysses ordered his sailors to tie him onto the mast of the ship and to put wax in their own ears to avoid being tempted by the songs of the Sirens. By doing so, Ulysses managed to steer away from the Sirens and continue his journey. Equivalently, by tying the hands of managers, one may be able to make them resist the short-term temptations of the market and achieve a more profitable outcome.

Lafontaine and Slade (1997) cite six prior studies that find that franchised outlets charge a higher price than company-owned outlets. Two studies deal with gasoline stations (Barron and Umbeck, 1984; Shepard, 1993), two with fast-food chains (Lafontaine, 1995; Graddy, 1997), one with pubs (Slade, 1998a), and one with soft-drink bottlers (Muris *et al.*, 1992). By way of contrast, in our study, we find that in more oligopolistic contexts, company-owned units price higher than franchised units, leading to the conclusion that ownership form has differential effects under different competitive contexts. With the present chapter, we hope to contribute to the above literature by quantifying the double marginalization effect and separating it from other reasons that potentially affect the price charged to customers. The availability of royalty fee data provides the unique opportunity to accurately measure double marginalization and control for the distortion that results from it. We show that the price distortion that results from double marginalization is directly proportional to the level of royalty fees in franchising. Moreover, we find evidence that the royalty fee/price distortion decreases as competition becomes more intense.

The direct generalizability of our findings is limited to industries in which both franchised and company-owned establishments operate. Moreover, the direction of the strategic incentives effect is contingent on the nature of the industry as one

based on price competition among differentiated offerings. The hypotheses may not extend to other industry settings where competition focuses on capacity or investment preemption, and where an aggressive preemptive strategy is more appropriate. However, the general finding that characteristics of the firm affect competition between firms may be more broadly applicable. This study has focused on ownership of the firm as one characteristic that affects managerial incentives. Before one can conclude that in general “the inside matters for competition”, future research should study other firm characteristics, such as compensation schemes and organizational structure, and their effect on inter-firm rivalry.

This chapter starts exploring the effect of managerial incentives on rivalry. We examine how market concentration influences the strategic effect of incentives. It would be valuable to refine this investigation by examining competitive responses among rivals. Using a structural econometric model, one could verify whether the assumption of strategic complementarity is justified and whether strategic pricing achieves its intended price response and performance effect.

5. Conclusion

By studying how the inside of the firm—organizational characteristics, such as compensation systems, organizational structure, and ownership form—affect the outside of the firm—product-market competition between firms that operate on the same market—this dissertation has tried to link the competitive strategy and organizational theory literatures. By doing so, we hope to contribute to the understanding of the internal functioning of business organizations and the rivalry between these organizations. The purpose of the literature review (Chapter 2) is to determine the current state of the theoretical and empirical strategic incentives literature—the theory that explores the link between managerial incentives and product-market competition in oligopolistic situations. We conclude that the existing literature, while growing and maturing in its approximately 20 years of existence, displays at least two significant shortcomings. First, the theoretical strategic incentives literature has studied elements of organizational design, ignoring the possible interaction between these elements. This could be a significant limitation, because, as we know, the organizational design of business firms always consists of multiple elements, such as compensation systems and organizational structure. Second, we conclude that the empirical strategic incentives literature is scant. Very few empirical studies have explored the interaction between organizational characteristics and product-market competition, and the findings of these studies are far from conclusive. Chapter 3 aims at contributing to the management literature by addressing the first weakness, while Chapter 4 addresses the second limitation of the existing literature.

In Chapter 3, a game-theoretical study of the effect of organizational design on the intensity of rivalry is carried out. Rather than focusing on one element of organizational design in isolation, this study explores the interaction of two organizational design features: compensation systems and organizational structure. By increasing the richness of the study, as compared to the existing literature, we hope to bring the exploration closer to reality. The study provides a number of interesting and surprising results. First, the study shows that otherwise identical firms may endoge-

nously choose different organizational designs. In other words, firms do not choose the single “optimal” design that they agree maximizes profits, but each firm chooses a unique organizational design, although both firms are identical *ex ante*. This is an important finding because one of the strategy field’s core tasks is to explain firm heterogeneity. Second, we show that organizational design could be used as a means to decrease the intensity of rivalry. Previous research has repeatedly shown that, if firms compete in strategic substitutes, they have a tendency to commit to aggressive behavior, which may lead to a prisoner’s dilemma in which excessive rivalry drives diminished industry and firm profitability. In contrast, in Chapter 3 we show that multidimensional organizational design permits firms to avoid this overly aggressive behavior, increasing industry and firm profits.

Chapter 4 conducts an empirical investigation of managerial incentives and inter-firm rivalry. In the context of the Texas hotel industry, we explore how ownership forms affect managerial incentives, which, in turn, influence competition between hotel establishments. We compare the functioning of two different kinds of ownership forms: franchised and company-owned establishments. The core argument in this chapter is that the decentralization or delegation, which takes place in the case of corporations with company-owned establishments, allows these corporations to commit to playing the role of local price leaders, which dampens competition and increases profits. Franchised units, in contrast, do not have the same decentralization: the owner, or residual claimant, is also the manager of the establishment. While the owner of the franchised firm may *want* to refrain from discounting, the incentive to undercut competitors is too strong: a temptation the owner cannot resist. In Chapter 4, we thus hope to show that ownership forms can be used to manage rivalry and increase profitability.

While Chapters 3 and 4 contain the same subject matter, i.e., *dependent* variable, namely competition and more precisely, the intensity of rivalry, the chapters differ in their methodology, theoretical versus empirical, and in their *independent* variables, organizational design versus ownership form. The main connecting theme, however, is the study of the relationship between internal organizational characteristics and

external competitive behavior. We hope that each chapter, in its own way, has contributed to the edification of this relationship.

This dissertation, obviously, has its limitations. Although the theoretical study in Chapter 3 brings strategic incentives theory one step closer to organizational designs that are used in reality, the specific assumptions of the game-theoretical model—the use of relative performance evaluation and vertical decentralization—remain idiosyncratic. It would be valuable to conduct further research that studies the relationship between multidimensional organizational design and product-market competition. This future research could entail both different and more general assumptions. A possible limitation of Chapter 4 is that it focuses on equilibrium situations, i.e., examining average firm behavior under different circumstances. Investigating out-of-equilibrium situations would allow a better understanding of actions and reactions, focusing on specific moves by firms and the countermoves these incite from direct rivals. Another worthwhile subject to examine are the antecedents of ownership form. More specifically, it would be interesting to determine whether, or under what circumstances, firms take the anticipated effect of ownership choice into account when they decide which ownership form to use in a specific setting. Finally, it would be valuable to explore how corporate divisionalization affects individual unit behavior. Many hotel corporations operate multiple brands. Do units of different brands that belong to the same corporation behave as if they are owned independently, or do these units take the effect of their own behavior on these units into account?

The concept of *incentives* plays a fundamental role in this dissertation. During the work on this dissertation, my understanding of this concept has evolved. A specific treatment of this concept could be valuable as it simultaneously explains the focus and boundaries of this dissertation and provides insight in the learning process of its author. At the very beginning of the dissertation, the center of interest was the idea of *relative* performance: the desire to be better than others, perceived as more important than *absolute* performance. I was advised to use this concept not as a primitive, i.e., a property that is (assumed) part of the economic agent right from its conception, but as an instrument used to control economic agents.

In other words, I was advised to study relative performance *evaluation* as an *incentive* mechanism. When writing the dissertation proposal, I defined an incentive as something that incites action; a stimulus; an encouragement. I distinguished compensation systems, such as relative performance evaluation, from the incentives these systems create.³⁵ Also other elements of organizational design, such as organizational structure, and ownership forms, in my definition, affect (managerial) incentives. Managerial incentives can thus be seen as a theoretical construct, the idea that people make economically rational decisions. When developing the empirical study, I came to the realization that managerial incentives are not “difficult to observe”, but plainly unobservable, a theoretical construct. Thus, each empirical study of strategic incentives involves the identification of an observable construct that arguably affects managerial incentives. While compensation schemes might be “more directly” linked to managerial incentives, compensation schemes, ownership forms, or any other observed variable remain an antecedent of incentives, not incentives themselves. One might wonder whether this theoretical construct is a necessary constituent of the presented studies. Could we discuss the *direct* effect of organizational design and ownership form on competitive interaction, without the mediating effect of managerial incentives? Perhaps this is possible, but the use of incentives as a mediating variable allows the use of internally coherent, economic reasoning, linking different elements of organizational form with managerial behavior. Finally, through the field study, I recognized that both compensation systems and control through fiat affect managerial incentives. From my knowledge of the theoretical strategic incentives literature, I implicitly expected that strategic delegation always involves the use of compensation systems, for example variable pay linked to a sales or relative performance objective. However, control through fiat or rules obviously also affects managerial behavior. One may consolidate these two mechanisms by realizing that fiat is not very different from compensation based on objectives: “You get fired if you do x ; you will get your salary if you do y .” The

³⁵This use of the word *incentives* is thus different from the usage of this word in sales force management, where *incentives* are bonuses, typically linked with the achievement of a specific goal.

evolution of my thinking and understanding of the role of incentives has deepened my comprehension of strategic incentives theory.

This dissertation is dedicated to the study of the intensity of competition, and the role organizational characteristics play in determining this intensity. As argued in the Introduction, the determinants of the intensity of competition are often subtle and only partially understood. This dissertation hopes to make a modest contribution to this intricate matter by elucidating the relationship between organizational characteristics, managerial incentives, and competitive interaction.

6. Appendix A. Classification of Empirical Strategic Incentives Literature (p. 1)

Authors	Industry	Data	Dependent variables	Independent variables	Conclusion	Classification
Aggarwal, Samwick, '99 J of Fin	cross-sectional	ExecuComp, Census of Manufacturers	compensation	π_i, π_j , concentration, interaction terms	β positive on average, but decreases as concentration increases	I-b, II-a, b, c, m, y
Chevalier, '95 AER	super-market	trade journals, CRSP, WSJI	stock prices, entry, expansion	financial leverage (LBOs)	LBO \Rightarrow more leverage \Rightarrow less competition \Rightarrow stock price of competitors increase	I-c, II-a, c, g, x
Chopin, '99 book chapter	cross-sectional	Forbes	compensation	π_i , sales, cost, cost x (market share, var., covar.)	29% (+), 14% (-) weight on sales, rest mainly on profits; no confirmation of theoretical model	I-b, h (x)
Corts, '01 JEMS	movies	trade journals	time between product introductions	joint distributor/producer/division	movies from same producer (even different divisions) and distributor are released further apart	I-a, II-d, x
Gibbons, Murphy, '90 ILRR	cross-sectional	Forbes, Compustat, CRSP	compensation	firm/industry/market rate of return	CEOs are evaluated relative to the market and (albeit less) the industry	I-b, c
Graddy '97 JBES	fast-food	survey price data, census	price	race, income, ownership, costs	support for price discrimination on race; some support for lower price CO vs. FR outlets	I-d, II-a, m, x
Hill, Hitt, Hoskisson, '92, OrgSci	cross-sectional	survey, Compustat	ROA	relatedness, integration, decentr., control, incentives	fit between diversification strategy & org. design (internal cooperation vs. competition) improves performance	I-a, b, f
Janakiraman, <i>et al.</i> , '92 JAR	cross-sectional	Forbes, Compustat, CRSP	compensation	accounting ROE, stock return	not much support for RPE – only weak form RPE when using stock returns	I-b, c

Classification: Please refer to index table below.

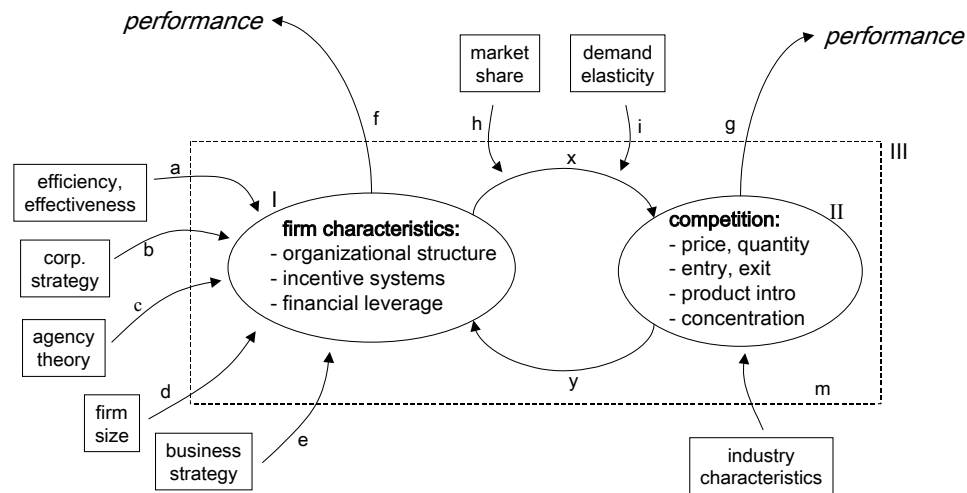
Letters in parentheses signify that the construct or link is dealt with theoretically but not empirically.

6. Appendix A. Classification of Empirical Strategic Incentives Literature (p. 2, continued)

Authors	Industry	Data	Dependent variables	Independent variables	Conclusion	Classification
Joh, '99 RES	cross-sectional (Japan)	Japanese Development Bank	compensation	change in firm and industry performance	μ is positive, but decreases as concentration increases or industries grow fast	I-b c, m y
Kalnins, Lafontaine, '96 NBER	fast-food restaurants	Texas Sales Tax Permit Holder, geographic zip code	multiple ownership	distance, similarity, contiguity	franchising is not strategic delegation device, but minimization of costs and reliance on expertise	I-d a y
Kovenock, Phillips, '95 AER	cross-sectional	LRD	recapitalization	productivity, concentration, demand	debt is a disciplinary instrument, leverage is strategic variable in concentrated markets	I-c, II-a,b c, m x, y
Lafontaine, Slade, '97, JIE	lit review : retail contracting				appendix: agency model including strategic interaction	I-d, II-a c, d x, y
Lyandres SSRN Wp	cross-sectional	ExecuComp, Compustat	(1) firm/industry leverage, (2) compensation	no of firms, size (log sales), age, (2) leverage	leverage depends on competitive-ness (-), size, age (+); leverage, compensation are substitutes	I-b,c, II-b,e d y
Shepard '93 RAND	gasoline	census of stations collected by Lundberg Inc.	price	ownership, station characteristics	supports agency theory, some evidence that decentralization-vertical separation increase price	I-d, II-a c x
Slade '98 JLEO	gasoline	personal data gathering (previous paper)	likelihood of vertical separation (delegate pricing)	difference between own and cross price elasticity	large elasticity difference \Rightarrow separation creates market power \Rightarrow higher likelihood to separate	I-d i y
Slade '98 Econ J	beer	Nielsen, UK stats	price, profit margin	ownership, control: beer type, firm	untying the tied bars increased prices, support for strategic delegation	I-d, II-a m, x

6. Appendix A. Classification of Empirical Strategic Incentives Literature (p. 3, continued)

I-a	organizational structure	a	efficiency, effectiveness \Rightarrow firm characteristics
I-b	incentive systems	b	corporate strategy \Rightarrow firm characteristics
I-c	financial leverage	c	agency theory \Rightarrow firm characteristics
I-d	ownership	d	firm size = output quantity \Rightarrow firm characteristics
I-e	culture	e	business strategy \Rightarrow firm characteristics
II-a	price competition (Bertrand)	f	firm characteristics \Rightarrow performance
II-b	quantity competition (Cournot)	g	competition \Rightarrow performance
II-c	entry, exit		
II-d	product introduction	h	market share \Rightarrow x
II-e	concentration	m	industry characteristics \Rightarrow competition
x	firm characteristics \Rightarrow competition	y	competition \Rightarrow firm characteristics



7. Appendix B. Proofs of Propositions

7.1. Proof of Proposition 3.1

Proposition 3.1 deals with the case that $\mu_i = 0$. This special case consists of three stages, with owner i choosing first the organizational structure O_i . Subsequently, if the organization is decentralized, transfer price i is determined by negotiation. Finally, marketing manager i chooses the quantity q_i to sell. We solve the game by backwards induction. Equilibrium values are denoted with a superscript $\hat{\cdot}$. First, we discuss the equilibria of the three distinct subgames: \widehat{DD} , \widehat{CC} , and \widehat{DC} . Subsequently, we determine the subgame-perfect equilibrium of this special case.

Assuming $O_i O_j = DD$, the optimal output quantity is given by

$$\widehat{q}_i^{DD} = \frac{a - 2w_i + w_j}{3b}.$$

The transfer price that maximizes the production department's profits is equal to $\frac{1}{3}a$. Therefore, after bargaining the transfer price paid by the marketing department equals $\widehat{w}_i^{DD} = \frac{1}{3}a\alpha$. Substituting \widehat{q}_i^{DD} and \widehat{w}_i^{DD} into the profit expression yields

$$\widehat{\pi}_i^{DD} = \frac{a^2}{81b}(3 + 2\alpha)(3 - \alpha), \quad 0 < \alpha \leq 1.$$

Assuming $O_i O_j = CC$, firms would attain the standard Cournot profits denoted $\widehat{\pi}_i^{CC}$, which equals $\frac{a^2}{9b}$. It is easy to verify that $\widehat{\pi}_i^{DD} > \widehat{\pi}_i^{CC}$ for $0 < \alpha \leq 1$. Moreover, note that $\widehat{\pi}_i^{DD}$ reaches a maximum at $\alpha = \widehat{\alpha} = \frac{3}{4}$, being $\widehat{\pi}_i^{DD} = \frac{a^2}{8b}$, which equals half the monopoly profits. This completes the proof of first and second parts of Proposition 3.1.

Assuming $O_i O_j = DC$, the equilibrium output quantities are given by

$$\begin{aligned} \widehat{q}^{DC} &= \frac{a - 2w_D}{3b}, \\ \widehat{q}^{CD} &= \frac{a + w_D}{3b}. \end{aligned}$$

The transfer price that maximizes the production department's profits is equal to $\frac{1}{4}a$,

which results in a paid transfer price after bargaining of $\widehat{w}^{DC} = \frac{1}{4}a\alpha$. Substituting \widehat{q}^{DC} , \widehat{q}^{CD} and \widehat{w}^{DC} into the profit expression yields

$$\begin{aligned}\widehat{\pi}^{DC} &= \frac{a^2}{72b}(4 + \alpha)(2 - \alpha), \\ \widehat{\pi}^{CD} &= \frac{a^2}{144b}(4 + \alpha)^2.\end{aligned}$$

Now, it is easy to verify that $\widehat{\pi}^{CD} > \widehat{\pi}_i^{DD}$ and $\widehat{\pi}_i^{CC} > \widehat{\pi}^{DC}$ for $0 < \alpha \leq 1$. Thus, centralization is the dominant strategy, and \widehat{CC} is the unique SPE. This completes the proof of the third part of Proposition 3.1. \square

7.2. Proof of Proposition 3.2

Proposition 3.2 deals with the case that $O_iO_j = CC$, allowing $\mu_i \in \mathfrak{R}$ (the CC -subgame). This subgame consists of two stages, with owner i choosing first the parameter μ_i , and then manager i choosing the quantity q_i to sell. We solve the game by backwards induction, starting with the marketing manager's optimization problem. Marketing manager i faces the following incentive scheme:

$$I_i^M = \pi_i(q_i, q_j) + \mu_i \pi_j(q_i, q_j), \quad i \neq j = 1, 2.$$

The first order condition in stage 2 yields the following expression for q_i as a function of μ_i and μ_j :

$$q_i^{CC}(\mu_i, \mu_j) = \frac{a}{b} \frac{\mu_i - 1}{\mu_i \mu_j + \mu_i + \mu_j - 3}.$$

The first order condition in stage 1 yields a continuum of solutions:

$$\mu_i^{CC} = \frac{\mu_j + 1}{3\mu_j - 1}.$$

The second order condition is satisfied for $\mu_i < \frac{1}{3}$. This completes the proof of the first part of Proposition 3.2.

Total industry output is independent of the value of μ_i , because as μ_i increases (decreases) in equilibrium μ_j decreases (increases), completely offsetting the effect of

μ_i . The equilibrium industry output, price, and firm profits are given by $Q^{CC} = \frac{3a}{4b}$, $P^{CC} = \frac{1}{4}a$, and $\Pi^{CC} = \frac{3a^2}{16b}$. Note that the output is larger than the output in standard Cournot without relative performance evaluation ($\frac{2a}{3b}$) and the profits are smaller than in Cournot ($\frac{2a^2}{9b}$). This completes the proof of the second part of Proposition 3.2. \square

7.3. Proof of Proposition 3.3

Proposition 3.3 deals with the case that $O_iO_j = DD$, allowing $\mu_i \in \mathfrak{R}$ (the DD -subgame). This subgame consists of three stages, in which, respectively, μ_i , w_i , and q_i are determined. Solving, as usual, by backwards induction yields the following expression for the quantities in the last stage:

$$q_i^{DD}(w_i, w_j, \mu_i, \mu_j) = \frac{a - 2w_i + w_j - a\mu_i + \mu_i w_j}{b(3 - \mu_i - \mu_j - \mu_i \mu_j)}.$$

Solving the second stage yields:

$$w_i^{DD}(\mu_i, \mu_j) = \frac{\alpha a(5 - 3\mu_i - \mu_j - \mu_i \mu_j)}{15 - \mu_i - \mu_j - \mu_i \mu_j}.$$

In the first stage, owner i maximizes overall firm profits by setting an optimal μ_i . Firm profits expressed in μ_i and μ_j are given by

$$\pi_i^{DD}(\mu_i, \mu_j; \alpha) = \frac{a^2}{b} \frac{f(\mu_i, \mu_j; \alpha)}{g(\mu_i, \mu_j)},$$

where $f(\mu_i, \mu_j; \alpha)$ is a polynomial including $\mu_i^4 \mu_j^3$, and $g(\mu_i, \mu_j)$ is a polynomial including $\mu_i^4 \mu_j^4$. There is no closed-form expression for the solution to the first order condition as a function of α .

Assuming symmetry, one can simplify after the first order condition has been taken by writing $\mu = \mu_1 = \mu_2$. The solutions to the following polynomial of the fifth

degree provide the optimal values for μ :

$$(3 - 2\alpha + \alpha^2)\mu^5 + (-11 + 16\alpha + \alpha^2)\mu^4 + (-58 + 36\alpha + 10\alpha^2)\mu^3 \\ + (306 - 384\alpha + 98\alpha^2)\mu^2 + (-297 + 606\alpha - 299\alpha^2)\mu - 135 - 144\alpha + 189\alpha^2 = 0.$$

This polynomial yields five solutions, of which four can be deleted (for $0 < \alpha \leq 1$), because they are either imaginary or yield negative w , q , or P . Again, given that α is unknown (even if restricted to a value of between 0 and 1), there is no explicit, general solution for this polynomial. However, solving numerically for specific values of α is possible.

If $\alpha = 0$, the condition becomes $3\mu^5 - 11\mu^4 - 58\mu^3 + 306\mu^2 - 297\mu - 135 = 0$, which can be written as:

$$3(\mu + 5)\left(\mu + \frac{1}{3}\right)(\mu - 3)^3 = 0,$$

yielding three solutions: -5 , $-\frac{1}{3}$, 3 . The second order condition does not hold for $\mu = -5$ and $\mu = 3$, so that only $\mu = -\frac{1}{3}$ is a solution for $\alpha = 0$. Note that this solution is identical to the symmetric solution of the *CC*-subgame. This confirms our finding because the *DD*-subgame with $\alpha = 0$ is mathematically identical to the *CC*-subgame. This completes the proof of the first part of Proposition 3.3.

If $\alpha = 1$, the condition becomes $\mu^5 + 3\mu^4 - 6\mu^3 + 10\mu^2 + 5\mu - 45 = 0$. This yields three real solutions (-4.62 , -1.53 , and 1.67) and two complex solutions. The first solution (-4.62) results in negative values for q , which is not possible by assumption. The third solution (1.67) produces negative values for the transfer price w , which is not possible by assumption. The second solution (-1.53) is admissible (second order condition holds, and q , w , and P are positive).

We have numerically calculated the solutions to the above polynomial (assuming symmetry) for 100 values of α between 0 and 1. The results show that there is a unique symmetric solution to the *DD*-subgame. The incentive parameter decreases monotonically from $\mu^{DD} = -\frac{1}{3}$ ($\alpha = 0$) to $\mu^{DD} = -1.53$ ($\alpha = 1$). The transfer price increases from $w^{DD} = 0$ ($\alpha = 0$) to $w^{DD} = 0.56a$ ($\alpha = 1$). The output quantity of

each firm decreases monotonically from $q^{DD} = \frac{3a}{8b}$ ($\alpha = 0$) to $q^{DD} = 0.30\frac{a}{b}$ ($\alpha = 1$). Profits increase monotonically from $\pi^{DD} = \frac{3a^2}{32b}$ ($\alpha = 0$) to $\pi^{DD} = 0.12\frac{a^2}{b}$ ($\alpha = 1$). Thus, as α increases, the transfer price increases, which reduces output because of double marginalization, which, in turn, is partially offset by a decreasing μ . Overall, the output quantity decreases in the direction of the monopoly or collusive output, increasing firm and industry profits (for ease of reference, denote firm profits in the symmetric DD -case as π_i^{DD-s}). This completes the proof of part two of Proposition 3.3.

If $\alpha = \alpha^o = \frac{2}{3}$, $\mu^{DD} = -1$, $w^{DD} = \frac{a}{3}$, $q^{DD} = \frac{a}{3b}$, and $\pi^{DD} = \frac{a^2}{9b} = \pi^{Cournot}$. Since π^{DD} increases monotonically in α , $\pi^{DD} > \pi^{Cournot}$ if and only if $\alpha > \alpha^o$. This completes the proof of the third part of Proposition 3.3. \square

For completeness, we analyze the general case of this subgame in which symmetry is not assumed. Numerically solving the DD -subgame without assuming symmetry yields asymmetric solutions for specific ranges of parameter values and the same symmetric solutions that are discussed above. Two asymmetric solutions are dismissed because they yield negative values for q_i and w_i . Four asymmetric solutions remain for which the second order condition is satisfied, and q_i , w_i , and P are positive. These solutions exist only if $\alpha > \alpha'$, where $\alpha' = 0.86$. Two of these solutions yield high profits for one firm and low profits for the other firm; denote these profits as π_H^{DD} and π_L^{DD} , respectively. The other two solutions yield very high profits for one firm (approaching the monopoly profits) and very low profits for the other firm (approaching 0); denote these as π_{HH}^{DD} and π_{LL}^{DD} , respectively.³⁶ The values for the asymmetric solutions to the DD -subgame are as follows. π_H^{DD} decreases (monotonically) from $0.22\frac{a^2}{b}$ ($\alpha = \alpha'$) to $0.18\frac{a^2}{b}$ ($\alpha = 1$), π_L^{DD} increases from $0.02\frac{a^2}{b}$ ($\alpha = \alpha'$) to $0.06\frac{a^2}{b}$ ($\alpha = 1$), π_{HH}^{DD} increases from $0.23\frac{a^2}{b}$ ($\alpha = \alpha'$) to $0.25\frac{a^2}{b}$ ($\alpha = 1$), and π_{LL}^{DD} decreases from $0.01\frac{a^2}{b}$ ($\alpha = \alpha'$) to 0 ($\alpha = 1$). As shown in Appendix B Section 5, the asymmetric solutions of the DD -subgame do not constitute SPEs of the overall game.

³⁶Since each firm can either have the high or low profits, this makes a total of four equilibrium solutions.

7.4. Proof of Proposition 3.4

Proposition 3.4 deals with the case that $O_i O_j = DC$, allowing $\mu_i \in \Re$ (the DC -subgame). This subgame consists of three stages, in which, respectively, μ_i , w_D , and q_i are determined. In Section 3.4, the DC -subgame is discussed in relative detail, so that the discussion here will be brief.

In equilibrium, the incentive parameters are as follows: $\mu^{DC} = \frac{\alpha-4}{\alpha}$ and $\mu^{CD} = 1$. Thus, for $0 < \alpha \leq 1$, $\mu^{DC} < 0$ and $\mu^{CD} > 0$, which completes the proof of the first part of Proposition 3.4.

Industry profits are equal to $\frac{a^2}{4b}$ independent of α , which equals the monopoly profits. This proves the second part of Proposition 3.4.

The profits of the decentralized firm are given by $\pi^{DC} = \frac{a^2}{8b}(2 - \alpha)$, which decreases in α . The profits of the centralized firm are given by $\pi^{CD} = \frac{a^2}{8b}\alpha$, which increases in α . Thus, if $0 < \alpha < 1$, $\pi^{DC} > \pi^{CD}$. If $\alpha = 1$, the profits of both firms are equal to $\frac{a^2}{8b}$. This completes the proof of the third part of Proposition 3.4. \square

7.5. Proof of Proposition 3.5

The SPE of the overall game is determined by comparing the equilibrium profits of the four subgames (CC , CD , DC , and DD). In Section 3.5, each subgame is evaluated as a candidate for the SPE. A subgame is SPE (for a certain value of α) if there is no unilateral deviation possible that increases the payoff of a player. Here, we follow the same structure and provide some details that have been omitted in Section 3.5.

The CC -subgame does not constitute an SPE. Note that $\pi^{CC-s} < \pi^{DC} \forall \alpha$, which precludes $CC-s$ (the symmetric solution to the CC -subgame) to be an SPE. Moreover, since $\pi_L^{CC} < \pi^{CC-s} < \pi^{DC} \forall \alpha$, asymmetric solutions to the CC -subgame cannot be an SPE, either.

Asymmetric DD -subgames do not constitute an SPE. Note that $\pi_{LL}^{DD} < \pi_L^{DD} < \pi^{CD} \forall \alpha$, which means that the firm that obtains low profits in the asymmetric DD -subgame could increase its payoffs by defecting to DC .

For low enough α ($\alpha < \alpha^* = 0.95$), $DD-s$ is an SPE, because $\pi^{CD} < \pi^{DD-s}$,

which means that defecting to DC would not increase the firm's profits. For $\alpha > \alpha^*$, $DD - s$ does not constitute an SPE.

Whether the DC - and CD -subgames constitute SPEs depends on the off-equilibrium path strategies, i.e., the strategies that are related to the DD - and CC -subgames. For simplicity, we first restrict the equilibria on the off-equilibrium path to being symmetric. Now, we explore whether the decentralized (centralized) firm has an incentive to defect to the $CC - s$ - ($DD - s$)-subgame. Recall that $\pi^{CD} < \pi^{DD-s}$ for $\alpha < \alpha^*$ and $\pi^{CD} > \pi^{DD-s}$ for $\alpha > \alpha^*$, and $\pi^{DC} > \pi^{CC-s} \forall \alpha$. Consequently, if the off-equilibrium path strategies are symmetric, DC is an SPE for $\alpha > \alpha^*$.

However, if the centralized firm could obtain high or very high profits (remember that there are two pairs of asymmetric solutions) in the asymmetric DD -subgame, this would increase its profits, and therefore DC (for $\alpha > \alpha^*$) would not be an SPE.

The same reasoning holds if the decentralized firm could obtain high profits in an asymmetric CC -subgame, with the understanding that the CC -subgame has a continuum of asymmetric solutions, rather than two pairs of asymmetric solutions. The equilibrium value for μ_1 (implying μ_2), such that $\pi^{DC} = \pi_H^{CC}$, is given by $\mu_1 = \frac{2\alpha-3}{2\alpha-1}$ (μ_1 is the incentive parameter in the CC -subgame of the firm that was decentralized in the DC -subgame). For example, when $\alpha = \alpha^*$, $\mu_1 = \frac{2\alpha^*-3}{2\alpha^*-1} = -1.22$ implies that $\pi^{DC} = \pi_H^{CC}$. The DC -equilibrium can only be an SPE if $\mu_1 > \frac{2\alpha-3}{2\alpha-1}$ in the equilibrium of the CC -subgame. As α increases, this restriction becomes more strict, until at $\alpha = 1$, μ_1 must be larger than -1 . In conclusion, the DC -equilibrium is an SPE of the overall game for $\alpha > \alpha^*$, provided that the decentralized firm in DC is not too aggressive in the off-equilibrium CC -subgame. Note again that symmetry in the CC -subgame, i.e., $\mu = -\frac{1}{3}$, is sufficient, but not necessary, to avoid the risk of defecting to CC .

Finally, consider the possibility that the defecting firm would obtain low rather than high asymmetric profits in the DD -subgame. In this case, DC could also be an SPE for $\alpha' < \alpha \leq \alpha^*$. This would happen if the centralized firm obtained low or very low profits in the DD -subgame ($\pi_{LL}^{DD} < \pi_L^{DD} < \pi^{CD}$) and the decentralized firm obtained not too high profits in the CC -subgame, i.e., if $\mu_1 > \frac{2\alpha-3}{2\alpha-1}$, as before.

To summarize, the CC -subgame and asymmetric DD -subgame are not SPEs of the overall game. The symmetric solution to the DD -subgame constitutes an SPE, iff $\alpha < \alpha^*$, without any restrictions on the off-equilibrium path strategies. The DC - and CD -subgames are SPEs for $\alpha > \alpha^*$, iff the off-equilibrium strategies in the DD -subgame yield low, very low, or symmetric profits for the firm that is centralized in DC/CD , and the off-equilibrium strategy in the CC -subgame of firm D satisfies $\mu_1 > \frac{2\alpha-3}{2\alpha-1}$. The DC - and CD -subgames are SPEs for $\alpha' < \alpha < \alpha^*$, iff the off-equilibrium strategies in the DD -subgame yield low or very low profits for firm C , and the off-equilibrium strategy in the CC -subgame of firm D satisfies $\mu_1 > \frac{2\alpha-3}{2\alpha-1}$. Thus, for $\alpha < \alpha'$, the SPE is unique ($DD-s$), for $\alpha' < \alpha < \alpha^*$, three equilibria exist ($DD-s$, DC , and CD), and for $\alpha > \alpha^*$, two equilibria exist that are each other's mirror image (DC and CD).

Assuming symmetry on the off-equilibrium path, the formulation of the SPE is simpler: $DD-s$ is an SPE for $0 < \alpha < \alpha^*$ (first part of Proposition 3.5) and DC and CD are equilibria for $\alpha^* < \alpha \leq 1$ (part two of Proposition 3.5), without further restrictions. Recall, from Section 3.3, that we denote $\alpha^o = \frac{2}{3}$ the value of α for which $\pi^{DD}(\alpha)$ equals the standard Cournot profits. Note that, if $0 < \alpha \leq \alpha^o$, $DD-s$ is the unique equilibrium and the industry profits are lower than, or equal to, the standard Cournot profits (i.e., $\Pi^{DD-s} \leq \Pi^{Cournot}$). This completes the proof of the third part of Proposition 3.5. If $\alpha^o < \alpha \leq 1$, $DD-s$ and DC/CD are equilibria. In this case, $\Pi^{DD-s} > \Pi^{Cournot}$ and the industry profits in the DC - and CD -subgames are larger than standard Cournot profits, independent of α . Thus, the use of decentralization and relative performance evaluation in combination increases profits iff $\alpha > \alpha^o$. This completes the proof of the fourth part of Proposition 3.5. \square

8. Appendix C. List of Interviewees for Field Study (p. 1)

Person	Function	Organization	Topics	How	Date
Ben	Senior VP Franchise	hotel corporation 4, USA	pricing, CO vs. FR, price leadership, franchising strategy, cost structure	person	dec-04
Bill	General Manager	upscale company-owned hotel, Albania	pricing, CO vs. FR	person	mar-04
Caroline	Revenue Manager East & Central Europe	hotel corporation 5, Europe	yield mgt, competition, pricing policy	person	may-04
Cathy Enz	Professor	Cornell Hotel School	competition, yield mgt, franchising, difference between ownership forms	person	aug-04
Charlotte	General Manager	upscale independent hotel, France	pricing, yield mgt cost structure, compensation, pricing	person person	oct-02 nov-02
Chris	Revenue Manager West Europe	hotel corporation 5, Europe	CO vs. FR, competition, yield mgt, price discrimination	person	jan-05
Gordon	Principal	hotel consultancy, Texas	competition, ownership forms, customer segments, development	person	apr-04
Heather	Director of Finance, Europe	hotel corporation 5, Europe	competition, pricing, compensation, cost structure	person	may-04
Ioanna Popescu	Assistant Professor	INSEAD	yield/revenue mgt	person	jan-03
Jack	Area Manager East-Europe	hotel corporation 5, Europe	mgt contract, CO vs. FR, ownership forms, pricing, competition	person	mar-04
Jenny	Franchising Department	hotel corporation 2, USA	pricing	phone	nov-02

8. Appendix C. List of Interviewees for Field Study (p. 2, continued)

Person	Function	Organization	Topics	How	Date
Jim	Accounting Department	hotel corporation 1, USA	franchise fees	phone	may-04
John	Owner, franchisee	economy franchised hotel	sales force mgt, competition, market segments, franchise fees,	person email	dec-04
Laura	Manager	midscale company-owned hotel 3, France	organization	person	dec-02
Lydia	Research Director	American Hotel & Lodging Association Info Center	difference between ownership forms, franchising, brand segments	phone email	sep-03
Matthew	Sales & Marketing Manager	upscale company-owned hotel, Texas	pricing, competition, compensation, sales force mgt, CO vs. FR	person	dec-04
Nicolas	Vice President	hotel corporation 4, Europe	cost structure, competitive strategy, pricing, compensation, incentives	person	feb-03
Olivier	General Manager	economy company-owned hotel 2, France	cost structure, budgeting	person	nov-02
Paul	VP Pricing & Information Systems	hotel corporation 4, USA	pricing, branding, competition, economic cycles, price leadership	person	dec-04
Peter	Franchising Department	hotel corporation 5, USA	mgt contract, ownership forms	phone	nov-03
Raj	Owner, Manager	economy franchised hotel, Texas	expansion through franchising, location choice	phone email	nov-03
Robert	Franchising Department	hotel corporation 3, USA	pricing, franchise fees, incentives	phone	nov-02
Sarah	Franchising Department	hotel corporation 1, USA	pricing (franchisor vs. franchisee)	phone	nov-02
Stephan	Room Department Manager	upscale company-owned hotel 1, France	pricing, difference between ownership forms	person	oct-02

9. Appendix D. Brands Operating Both Franchised and Company-Owned Hotels

Segment	Brand Abbr.	Brand	Price US\$	Occupancy rate	Capacity (rooms)	Royalty fee	Perc. FR	Perc. CO	Nr of hotels
1	CTRYH	Country Hearth Inn	50.55	55.4%	42	4.00%	28%	72%	8
1	MTL 6	Motel 6	36.95	64.7%	110	4.00%	14%	86%	95
1	REDRF	Red Roof Inns	44.62	60.1%	129	4.48%	24%	76%	28
1	SHONE	Shoney's Inns & Suites	50.56	55.0%	98	3.50%	33%	67%	7
1	STUD6	Studio 6	35.69	66.3%	131	5.00%	17%	83%	6
2	BAYMT	Baymont Inns & Suites	49.58	57.2%	105	5.00%	21%	79%	10
2	CANDL	Candlewood Hotels	59.52	63.5%	121	4.75%	13%	87%	11
2	HAMPT	Hampton Inns & Suites	66.68	66.0%	105	4.00%	91%	9%	61
2	MAINS	Mainstay Suites	61.59	55.0%	80	4.50%	72%	28%	4
2	SLEEP	Sleep Inns	53.32	55.9%	84	4.50%	60%	40%	9
2	TOWNP	Town Place Suites	68.66	60.1%	106	5.00%	62%	38%	5
2	WELLS	Wellesley Inn & Suites	53.64	56.4%	124	4.50%	15%	85%	7
3	DCLUB	Club Hotel by Doubletree	72.41	59.0%	190	3.88%	61%	39%	4
3	HARVE	Harvey Hotels	82.33	61.2%	314	4.52%	31%	69%	5
3	HOLID	Holiday Inn	68.58	61.2%	214	5.04%	83%	17%	78
4	AMSTE	AmeriSuites	76.82	63.3%	127	5.00%	22%	78%	15
4	COURT	Courtyard by Marriott	87.86	70.0%	137	5.42%	58%	42%	37
4	CROWN	Crowne Plaza Hotels	76.85	62.4%	278	5.00%	37%	63%	6
4	HOMEW	Homewood Suites by Hilton	100.53	65.5%	103	4.00%	69%	31%	16
4	RADIS	Radisson	79.72	59.2%	272	4.00%	87%	13%	14
4	RESID	Residence Inn by Marriott	98.95	72.6%	110	4.96%	59%	41%	29
4	STAYB	Staybridge	88.48	60.2%	111	5.00%	20%	80%	3
4	WYNDH	Wyndham Hotels & Resorts	110.05	61.0%	404	5.00%	36%	65%	8
5	DBLST	Doubletree Suites	131.99	73.0%	269	3.94%	54%	46%	2
5	DOUBL	Doubletree	108.02	67.7%	374	3.94%	86%	14%	6
5	EMBAS	Embassy Suites	113.12	69.2%	224	4.00%	45%	55%	16
5	OMNI	Omni Hotels	112.87	64.0%	363	3.00%	11%	89%	9
5	SHERA	Sheraton Hotels/Inn/Resorts	97.01	61.6%	308	5.00%	73%	27%	10

Legend. Average price in US\$ per night per room. Segments: (1) economy, (2) mid-scale without food and beverage, (3) midscale with food and beverage, (4) upscale, and (5) upper upscale. Percentage franchised/company-owned: average number of units in Texas that are company-owned/franchised divided by the total number of units for the same chain.

10. Appendix E. Examples of Company-Owned and Franchised Hotels



Fig 1. Company-owned hotel

Red Roof
New Loop 410
San Antonio, Texas

Average price (1997-2002): US\$ 45



Fig 2. Franchised hotel

Red Roof
US Highway 90
San Antonio, Texas

Average price (1997-2002): US\$ 40

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