Contractual Arrangements as Signaling Devices: Evidence from Franchising

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1. Introduction

In the presence of asymmetric information, the notion that firms may use a variety of instruments to provide relevant information about themselves or their product is now well established in industrial organization. For example, pricing, advertising, and warranty decisions have all been suggested as means by which a firm can signal the quality of its product.[1] Recently, this type of reasoning has also been applied to the area of contractual arrangements. More

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1. See, notably, Cooper and Ross (1984), Kihlstrom and Riordan (1984), and Wolinsky (1983); the possibility that firms may use multiple signals is examined in Matthews and Moore (1987), Milgrom and Roberts (1986), and Wilson (1985), among others.

specifically, Gallini and Wright (1990) and Beggs (1992) argue that the use of royalties on sales in licensing agreements might be explained by the need for the licensor to signal the value of the offered technology. A similar point is made relative to vertical relationships in general, and franchising contracts in particular, in Tirole (1988). Finally, Gallini and Lutz (1992) argue that in the context of franchising, not only can the use of royalty rates act as a signal to potential franchisees, but so can the proportion of outlets franchisors choose to operate directly rather than franchise. Theirs is the first model of franchising to address directly the issue of dual distribution, that is, of franchisors' tendency to operate some stores directly and to franchise the others. Other theories of franchising must rely on outlet heterogeneity and limitations on the variety of contracts that can be used to give rise to dual distribution.[2]

This article's contribution is to provide an empirical assessment of this proposition that signaling may explain franchisors' choices of royalty rates and franchise fees, as well as their tendency to operate outlets directly. Franchisors' observed choices of royalty rates, franchise fees, and proportion of company-owned outlets at the time they begin franchising are related empirically to a measure of their types. This measure is calculated based on the rate of growth in the number of outlets of each franchised chain in the years that follow the franchisor's involvement in franchising.

This analysis of whether or not franchise contracts serve a role as signaling devices should be useful in at least two respects. First, it guides us in the process of identifying the theories that can best explain franchising. This is important given that franchising has become a very prevalent type of organizational arrangement in the U.S. economy. At present, the U.S. Department of Commerce (U.S. DOC) estimates that more than one-third of all retail sales occur through outlets of franchised companies (U.S. DOC, 1988). Second, because it provides an empirical test of the importance or relevance of signaling in a particular context, this article allows us to better evaluate the empirical importance and/or relevance of signaling theory in general. Given that signaling theory has been and continues to be applied to a number of different issues, it is important that we assess its empirical relevance, and that we begin to determine the circumstances under which signaling may be more or less important as an explanation for a particular phenomenon. Yet to date, very little empirical work has been done in this area in industrial organization.[3]

2. See Lafontaine (1992a) and Shepard (1993) for more on this.

3. A number of empirical analyses of signaling models have been carried out in finance and accounting. These are concerned notably with dividend policy or debt/equity ratios as signals of firms' quality, or with common stock repurchases at a premium or the underpricing of new issues as signals of the same. (See, for example, Balvers, McDonald, and Miller, 1988; Downes and Heinkel, 1982; Vermaelen, 1981; and the references therein). In general, the results in this literature are supportive of signaling models. However, in the marketing literature, the empirical evidence has not been very supportive of either the positive price–quality relationship implied by signaling models (see Curry and Riesz, 1988; Gerstner, 1985; Wiener, 1985; and the references therein) or the warranty–quality relationship suggested by such models (see Garvin, 1983; Gerner and Bryant, 1981; and Priest, 1981). One exception is Wiener (1985), who finds that product warranties do signal product reliability.

The present article focuses on the signaling hypothesis, but one finds a number of other explanations for franchising in the literature. These include models based on risk sharing (notably, Stiglitz, 1974, although he is concerned with sharecropping rather than franchising); on franchisee moral hazard combined with risk aversion (e.g., Stiglitz, 1974 and Mathewson and Winter, 1985), on two-sided moral hazard (Bhattacharyya and Lafontaine, 1992; Lal, 1990; Rubin, 1978); and on screening (e.g., Hallagan, 1978, also on sharecropping); as well as the traditional explanation for franchising based on capital market imperfections (e.g., Caves and Murphy, 1976). The empirical implications of these theories have been tested elsewhere (see, notably, Brickley and Dark, 1987; Lafontaine, 1992a; Martin, 1988; and Norton, 1988). Unfortunately, the framework needed to assess the implications of the signaling model does not readily lend itself to drawing conclusions about other theories. As a result, the main empirical evidence presented here cannot really be used to infer much about alternative theories. However, the existence of these alternative explanations implies that other factors, such as riskiness and incentive considerations, are likely to play a role in the design and use of franchise contracts. Thus these must be controlled for in the empirical analysis. Consequently, some of the results obtained herein—in particular, those that relate to the control variables—will bear on alternative models of franchising to some extent. These relationships with alternative theories, and with the existing empirical literature, are noted when appropriate.

The article is organized as follows. Section 2 provides a discussion of the theoretical framework, and of the empirical implications of signaling models for franchising contracts. Section 3 sets out the empirical model, and includes a brief description of the data and of the primary dependent and explanatory variables. Section 4 elaborates on some of the data issues, providing more detailed information on variables and measurement, and on the empirical methodology. Empirical results, and their interpretation, are found in Section 5. Section 6 concludes.

2. Theory and Empirical Implications

A franchise agreement is a contractual arrangement between two independent firms, whereby the franchisee pays the franchisor for the right to sell the franchisor's product and/or the right to use the franchisor's trademark at a given place and for a certain period of time. In business format franchising, franchise contracts typically involve the payment, by the franchisee to the franchisor, of a proportion of the franchisee's sales in royalties.[4] This propor-

4. The U.S. Department of Commerce classifies franchises according to the main component of the transaction: "Product and Trade Name Franchising" (also called "Traditional Franchising") is characterized by dealers who "concentrate on one company's product line and to some extent identify their business with that company" (U.S. DOC 1988: I). This type of franchising is limited to car dealerships, soft-drink bottlers, and gasoline service stations. In "Business Format Franchising" the relationship between franchisor and franchisee "includes not only the product, service, and trademark, but the entire business format itself—a marketing strategy and plan, operating manuals and standards, quality control, and continuing two way communication"

tion is usually constant over all sales levels.[5] In addition, franchisors almost always require a lump-sum franchise fee that is paid up front and only once for the duration of the contract—which, according to U.S. Department of Commerce (1988) is about 15 years on average.

Since franchising involves the transfer from the franchisor to the franchisee of a trade name and whole way of doing business, which are basically intangible assets, it has been argued that it is difficult for the buyer to assess the value of these assets a priori. This is especially true for potential franchisees interested in new franchise systems, that is, in systems offered by franchisors with no established reputation. This is emphasized in the trade literature by the pervasive calls for franchisees to "investigate before they invest."

In the theoretical literature, authors have analyzed this informational advantage of the franchisor and developed an explanation for franchising and franchise contracts that relies on franchisors' need to signal their type to potential franchisees. This signaling explanation has been used to explain franchisors' choices of contract terms, namely their royalty rates and franchise fees [see Beggs (1992) and Gallini and Wright (1990) on licensing contracts; Desai and Srinivasan (1990), Gallini and Lutz (1992), and Tirole (1988) on franchising], as well as their tendency to operate outlets directly (Gallini and Lutz, 1992). This section discusses the empirical implications of the above models in the context of franchising. The interested reader is referred to Appendix A for a description of a representative signaling model as it has been applied to franchising, as well as a more systematic derivation of the testable implications.

The main insight from the signaling literature in the context of linear payment rules such as those used in franchising is that "good" franchisors—that is, those with a high-value trade name—who have not yet established their reputation can signal their type by offering a contract that makes their revenues highly dependent upon the performance of the outlet. The argument is very similar to that found in Leland and Pyle (1977), where entrepreneurs can convince potential investors of the value of their project by investing more in it themselves. In other words, the contract a high-type franchisor (one with a high-value trade name) should offer to differentiate or separate himself from a low-type franchisor (one with a low-value trade name) would involve a higher royalty rate and lower franchise fee—to the point where the low type would find it unprofitable to imitate (see Beggs, 1992; Gallini and Wright, 1990; and Tirole, 1988). The reason why the low-type franchisor finds it unprofitable to imitate this contract is that the imposition of royalty rates leads to distortions in franchisees' price and quantity decisions due to double marginalization. It is assumed that the reduction in revenues arising from in-

(1988: 3). Examples include restaurants, business and employment services, and real estate agencies. In the remainder of this article the word "franchising" is used to mean business format franchising.

5. In Lafontaine (1992b), 93 of the 117 respondents said that their royalty rate was constant over all sales levels.

creases in the royalty rates are greater for low-type franchisors than they are for high types (this is the usual sorting condition; see Appendix A). Hence, in equilibrium, the high type will be able to separate from the low type by choosing a high enough royalty rate and a correspondingly low enough franchise fee. The low type, unable to profitably imitate this contract, will opt for a contract with no royalties, that is, a contract inducing no distortions downstream. In equilibrium, the royalty rate for the high type will be greater than the royalty rate of the low type, which is zero. At the same time, it can be shown that the franchise fee of the high type will necessarily be smaller than the franchise fee of the low type (see Appendix A).

Using T to denote the franchisor's type (or, equivalently, the value of the trade name) and extending the argument to a continuum of types or trade name values, the testable implications from the signaling model are as follows:

A1. For franchisors with no established reputation, holding other factors constant, the royalty rate, r, increases with T.

A2. For franchisors with no established reputation, holding other factors constant, the franchise fee, F, is decreasing in T.

Note that as a result of these two relationships, we should also find that the franchise fee F and the royalty rate r are inversely related. This will be the case here irrespective of whether or not the franchisee's participation constraint is binding. In most other models of franchising, a negative correlation between the two fees would arise only because franchisees are kept at their reservation level of utility—that is, because franchisee's participation constraints are binding.

The focus of the above discussion was on franchisors' capacity to signal through the terms of their franchise contracts. The argument underlying this result is that franchisors can signal their type by making their revenues depend on the value of the franchise. As noted in Gallini and Lutz (1992), besides levying royalties based on outlets' sales, franchisors can make their revenues depend on the overall value of their franchise by operating outlets directly. And most franchisors do own and operate a number of their outlets.[6] Hence Gallini and Lutz (1992) suggest that signaling might explain not only the use of royalties in franchising, but also why it is that franchisors operate some of their units, while franchising the others.

Three types of separating equilibria may occur in this new model. First, it

6. See, for example, Lafontaine (1992a): 431 of her 548 franchisors operated outlets directly. The average proportion of company-operated stores across the 548 firms was 17.25 percent. In fact, dual distribution is so much a part of franchising that most of the empirical work to date in this area has focused on explaining the franchise versus company-own decision. See, notably, Brickley and Dark (1987), Martin (1988), Minkler (1990), and Norton (1988).

could be that franchisors would decide not to use company ownership as a signal, in which case all signaling would again be achieved through the terms of their franchise contact. Hence the testable implications would still be A1 and A2. Alternatively, signaling may be done completely through franchisors' choice of contract mix, and not at all through the terms of the franchise contract. In that case, in equilibrium, good franchisors will signal their type by relying heavily on company ownership, while bad franchisors, unable to imitate, will choose not to operate any outlets directly. Extending this to a continuum of types, we have:

B1. For firms with no established reputation, holding other things constant, the proportion of company-owned outlets, α, increases with the franchisor's type or trade name value T.

Finally, both company-owned outlets and royalty rates may be used as signals. But even if firms use both of these to signal their type, there is still only one basic signal. In both cases, high-value franchisors differentiate themselves from lower-value chains by making their revenues depend on the value of their franchise. And the extent to which their revenues do depend on downstream sales—that is, franchisors' stakes in downstream operations—can be estimated through a combination of their royalty rates and their reliance on company ownership. If the contract mix and/or royalty rates are used as signaling devices, we should find that this stake increases with the franchisor's type, or that:

C1. For franchisors with no established reputation, holding other things constant, the franchisor's stake in downstream operations, which reflects both royalty rate and tendency to operate outlets directly, is increasing in the type or trade name value T.

In addition, if both signals are used, given a franchisor's type, the royalty rate and the use of company ownership should be negatively correlated. The two signals are basically substitutes, so that as one signal is used more to achieve the desired level of dependency of the franchisor's revenues on the outlets' performance, the other should be used less. Which combination of royalties and company-owned outlets is actually used will depend on the relative cost and efficiency of each signal. Hence we have:

C2. For a given type or trade name value T, the proportion of company-owned outlets, α, and the royalty rate r, are negatively correlated.

Finally, if the franchisee's participation constraint is binding, the franchise fee and the royalty rate should again be negatively correlated, but the franchise fee need not be decreasing, and the loyalty rate increasing, in the type of the franchisor when both signals are used simultaneously.

3. Empirical Specification

The data used in this article are obtained primarily from *Entrepreneur Magazine*'s yearly "Franchise 500" surveys (Entrepreneur, various years).[7] These surveys cover an average of about 1,000 franchisors each year, providing information on royalty rates, advertising fees, franchise fees, and the number of company-owned and franchised outlets in the chain.[8] The surveys also state the year in which the franchisors began their operations, the year in which they became involved in franchising, the type of business they are involved in, and the amount of capital required to open an outlet. The earliest usable survey covers data for 1980, and the last survey included in this research contains the 1989 data.[9]

A number of issues arise when trying to adapt these data to test the hypotheses developed above. First, the signaling model addresses the issue of how *new* franchisors can convey information about themselves through their initial contract mix and contract terms. As a result, one needs to construct a sample of franchisors for which data on the initial choices of contract terms, r and F, and of contract mix, α, are available. Hence only firms that started franchising on or after the first of the *Entrepreneur* survey years (that is, 1980) can be included in the sample.[10] This eliminates from the sample well-established franchisors such as McDonald's and Burger King, both of which started franchising around 1955.

Second, establishing empirical differences in behavior between high- and low-value franchisors requires that one measures their type or trade name value T. Since no data on sales or profits, at the outlet or the chain level, are available for these firms, this article relies on a measure of type based on the observed growth in the number of outlets of the franchised chain in the years that follow its involvement in franchising. This, of course, is based on the notion that a growing chain is a profitable chain. In the context of franchising, such an assumption is probably quite reasonable: Given the geographical nature of the types of businesses that are usually franchised, total sales and profits for chains tend to be highly correlated with the number of outlets.[11] However, measuring a firm's type based on its ex post success requires that we observe the firm a number of years after it starts franchising, so that we can

7. Other sources used here include Bond (1989) and the Department of Commerce's *Franchise Opportunities Handbook* (U.S. DOC, 1985, 1986, 1988).

8. Due in large part to entry and exit, these are not the same 1,000 franchisors each year.

9. The first survey was actually done in 1980, and contained the 1979 data. Unfortunately, in that survey, the advertising fee was not reported.

10. Because the calendar years do not provide appropriate cutoff points, I include those firms that started franchising in year $t - 1$ if they appear in the year t survey but did not appear in the $t - 1$ survey. Thus firms that started franchising in 1979 can be found in the sample despite the fact that the first survey was for 1980. The fees and contract mix reported in the year t survey are interpreted as initial contract offerings and contract mixes in such cases. The five-year difference required to calculate growth implies that these firms must be observed again in the year $t + 5$ survey or later, since their initial data are in fact for year t.

11. Also, measures of "success" based on outlets are used quite frequently in the trade literature on franchising. See for example *Venture*'s "The Franchise 100" (Venture, Various years).

assess its growth. Given 10 years of data, I chose 5 years as the minimum elapsed time over which to measure growth. Combined with the constraint from above that we observe their first year in franchising, this implies that only firms that started franchising between 1980 and 1984 can be part of the sample. A total of 168 franchisors were found to fulfill these conditions across the 10 surveys. Missing or inconsistent data led to the rejection of 43 of these, resulting in a final sample of 125 franchisors.

Hypotheses A1, A2, B1, and C1 imply that franchisors' choices of contract terms and company ownership should be explained by their quality levels, or types. Hence the firm's type, measured by its ex post growth, will be the main explanatory variable of interest here. However, several other variables should be controlled for in the empirical model, for a number of different reasons. First, input sales at a markup could be a substitute for royalties on sales, and hence for company operation of individual outlets in the present context.[12] But only if franchisees can be required to buy the inputs as part of the franchise agreement will the franchisor be able to charge prices above the competitive level.[13] This would imply that franchisors may have an additional signal at their disposal, namely the percentage of their franchisees' inputs they supply contractually, combined with the markup they take on the sale of such inputs. This new instrument would warrant empirical analysis on its own, but because only aggregate data on input sales are available, rather than treat this variable as an additional signal, I include input sales here as a control variable. Second, other variables, such as the number of years the franchisor was in business before deciding to start franchising (a measure of reputation), or the sector in which the firm operates, and the year in which the firm began franchising, can convey information about the franchisor's type. These may reduce the need for the firm to signal through the dependent variables. Third, the existing empirical literature on franchising implies that factors such as risk, franchisee moral hazard, franchisor moral hazard, and capital requirements could influence franchisors' choices of contract terms and contract mix. Hence they should be controlled for in the empirical model.

Thus hypotheses A1, A2, B1, and C1 are characterized empirically as follows:

$$Y_i^j = \beta_0^j + \beta_1^j T_i + \sum_{k=2}^{n} \beta_k^j Z_{ki} + \varepsilon_i^j, \qquad j = 1,\ldots,4 \tag{1}$$

where Y_i^1 is franchisor i's royalty rate, Y_i^2 is the franchise fee, Y_i^3 stands for franchisor i's proportion of company-owned outlets, and Y_i^4 is the stake the firm has in downstream operations. All of these are measured at the time the firm becomes involved in franchising. The main explanatory variable in this

12. See, for example, Caves and Murphy (1976) on the equivalence between input markups and royalty rates.

13. I thank the editor, Alan Schwartz, for pointing this out.

model, T_i, is the measure of ex post growth that captures the type or trade name value of franchisor i. The Z_k's are the control variables, and the ε_i's are independent identically distributed error terms.

4. Data, Variable Specification, and Estimation Methods

This section provides more information on the various measurement issues involved in estimating the above model, and the variables used in the analyses. The reader is referred to Appendix B for more details on the data.

4.1 Dependent Variables

In order to estimate the empirical model described above, one must obtain measures of the contract terms, namely the royalty rates and franchise fees, of the contract mix, and of the stake franchisors have in downstream operations at the time they become involved in franchising. The first two are obtained directly from the survey data. The last two dependent variables present more of a measurement problem. That is because, by definition, when firms are just becoming involved in franchising, they are 100 percent company-owned. In other words, if the contract mix (or the stake in downstream operations) is to signal the franchisor's type in any way, the initial *number* of company-owned outlets must be the variable that serves as the signal, giving franchisees some idea about what the proportion of company-operated outlets might be over the next few years. In this article, I use first the logarithm of the number of company-owned outlets (denoted by $\hat{a}$) as a measure of the contract mix.[14] Second, I use a measure of what the proportion of company-owned outlets is expected to be after t years in franchising, given the number of franchises typical franchisors open up during their first t years in franchising. This last measure is denoted by α_t.[15]

To implement a test for the case where firms use both r and α to signal their type, given a measure such as α_t, one can estimate the stake the franchisor has in downstream operations by combining royalties and company ownership as follows:

$$S_t = \frac{\alpha_t \cdot AvSales^c + (1 - \alpha_t)AvSales^f \cdot r/100}{\alpha_t \cdot AvSales^c + (1 - \alpha_t)AvSales^f} \tag{2}$$

where $AvSales^c$ and $AvSales^f$ refer respectively to average sales per company-owned and per franchised outlet, at the time the firm becomes involved in franchising. This formula gives the share of the chain's revenues that is

14. Because some firms have no company-owned outlets when they start franchising, I add 0.5 to the number of outlets before taking the logarithm. Also, results were equivalent whether I used the number of company-owned outlets, or its logarithm.

15. In other words, I use $\alpha_t = c_0/(c_0 + f_t)$ as one way to capture the theoretical ownership proportion, where f_t is the number of franchised units typically opened within t years in franchising. This measure assumes that the number of company-operated outlets remains constant at the initial level of c_0. This is well supported by the data. The median number of franchised units opened during the first 3 (5) years in franchising, f_3 (f_5), was 20 (32).

appropriated directly by the franchisor at time t. Unfortunately, data on average sales per outlet are unavailable for individual franchisors. Aggregate data on sales per company-operated and franchised outlets are obtained on a sectoral basis from the U.S. Department of Commerce (1988).[16] (See Appendix B for more details.)

Finally, one may assume that firms continue to signal their types for a few years beyond the time at which they actually become involved in franchising. In that case, the actual proportion of company-owned outlets, α_a, and the actual S_a [estimated from (2) given α_a] three or four years after the firm gets involved in franchising may also be used to measure α and S, respectively. Specifically, α_a and S_a are measured two years before the end of the five-year-plus period separating the two observations on each firm. (See Appendix B for more details).

4.2 Explanatory Variables

As noted earlier, the measure of type used in this article is based on the observed rate of growth of each chain in the years that follow its involvement in franchising. The growth rate is measured as the difference in the logarithm of the number of outlets between two time periods at least five years apart (but as close as possible to five years apart) divided by the number of years between the two observations (which varies from 5 to 8 years).[17] Given that we know from Jovanovic (1982), as well as previous empirical work, that a firm's growth rate tends to decline as it becomes more mature, the actual measure used here to capture the type of the firm is the deviation of the firm's rate of growth from its expected rate of growth given its age. In other words, the actual measure of type is the error term from a regression of the growth rate on the number of years that a firm was in business before it began franchising.[18]

One drawback associated with using a measure based on the growth rate in the number of outlets to capture the intrinsic value of the franchise is that low-quality or even fraudulent franchisors may succeed in getting a large number of franchisees to invest in their system initially. As a result, their initial growth in number of outlets would be very large, despite their being of low quality. To alleviate this problem, I measure growth over a period of at least

16. $AvSales^c$ and $AvSales^f$ must be differentiated in this formula because average sales per company-owned outlets tend to be larger than those of franchised units. See *Franchising in the Economy, 1986–88* (U.S. DOC, 1988: Table 19).

17. Results were the same when the growth rate was measured as the proportional change in the number of outlets. Results were also unchanged when the growth rate in the number of franchises only was considered. Since I was interested in measuring the change in profitability, growth in the total number of outlets seemed a more appropriate measure.

18. The reciprocal functional form was used, in this regression, as it proved most satisfactory. Consistent with Jovanovic's model, and with most of the existing evidence, franchisors' growth rates were significantly inversely related to their age. An attempt was also made to control for the number of outlets a firm had as it became involved in franchising, but the coefficient for this variable was never significant. The qualitative results presented here remain the same if the growth rate is used directly as the measure of type.

five years; this relatively long period should minimize the effect that early phenomenal growth of low-quality franchised chains might have on the results. In addition, I examine how sensitive results are to initial growth by contrasting those obtained over the whole five-year-plus range with results obtained when the measure of growth is limited to the last two of the five or more years. These two ways of measuring growth are referred to as *Growth1* and *Growth2* in the remainder of this paper. After controlling for the firm's expected growth rate given its age, they become *Type1* and *Type2*, respectively.

Having described in some detail the main explanatory variable used in the empirical analyses below, I now turn to a discussion of the control variables. First, as noted earlier, it is necessary to control for input sales in considering the relationship between the signals and firm types, given that input sales at a markup could serve as an alternative signal. Unfortunately, the data do not allow a distinction between those sales from franchisor to franchisee that are contractually required (and hence on which the franchisor could charge a markup) and those that are voluntary on the part of the franchisee. Second, factors that allow the firm to differentiate itself from other franchisors must be included in the regressions. For example, the number of years in business prior to starting franchising may be related to or give information about the success a firm will achieve in franchising: In a sense, the firm has already established a reputation for itself in the market. In that case, a new franchisor need only distinguish itself from other new franchisors that have been in business for the same length of time. Thus one should control for the number of years a firm was in business prior to franchising in the empirical specification. Similarly, franchisors may need only to distinguish themselves from other franchisors getting involved in franchising at the same time they are. Because there are only a few possible years in which firms in this sample may have started franchising, from 1979 to 1984, dummy variables are used to control for this effect (with 1979 as the base case). Furthermore, individual franchisors may only compete with, and hence need only separate themselves from, other firms involved in the same type of business. This implies that sectoral dummy variables should also be used as control variables. Appendix B identifies which sectors are differentiated in this way.

Finally, controlling for factors suggested by alternative theories of franchising as potential forces influencing the firms' choices of contract terms and contract mix requires that one quantifies factors such as risk, franchisee moral hazard, franchisor moral hazard, and capital requirements. This task presents many challenges. First is the fact that it is not clear what the best measures are, and second are the constraints imposed by the available data. However, since most of these factors are likely to be more homogeneous within sectors than across them, sectoral dummy variables will be useful here as well. The dummy variables representing the year the firm became involved in franchising should also be useful in this respect. In addition, information concerning the sectoral rates of discontinuation of individual outlets for the appropriate years is provided in *Franchising in the Economy* (U.S. DOC, various years). These can be used as a measure of the degree of risk faced by potential

franchisees. Finally, the *Entrepreneur* surveys directly include an estimate of the amount of capital required to open an outlet in each franchised chain.[19]

Having found proxies for risk and for capital requirements, we are left with the measurement of both franchisee and franchisor moral hazard. In the case of franchisee moral hazard, measures of geographical dispersion have been used in the literature to capture differences in the cost of monitoring outlet performance (e.g., Brickley and Dark, 1987; Lafontaine, 1992a). These measures are based on the notion that a higher cost of monitoring makes franchisee moral hazard more problematic. The number of states in which a given chain has established outlets at the time of its initial franchise contract offering is the measure of geographical dispersion used here. It is available from the U.S. Department of Commerce's *Franchise Opportunities Handbook* (U.S. DOC, various years) for 66 of the 125 firms in the sample.

Finally, for franchisor moral hazard, one measure of the importance of the franchisor's role in the business that is available for the same 66 firms from the same source is the amount of training (in days) that is provided to new franchisees. This is assumed to capture the amount of know-how that is being transferred. Also, given that the trade name is the main franchisor input, and that it is likely to become more valuable the longer a firm has been in business, the number of years in business can be used to capture the importance of the franchisor's input. In this context, the effect of this variable on the royalty rates and on the reliance on company-operated outlets would be the opposite of those suggested by the signaling theory: Under franchisor moral hazard, the more valuable the trade name is (that is, the more important the franchisor's role in the franchise) the more incentives one would want to give to the franchisor. These greater incentives can be achieved either through higher royalties or through more company ownership.

4.3 Estimation Methods

All of the dependent variables of interest in this paper are bounded below at 0, and some are also bounded above at 100 (percent). Given that these boundaries represent a binding constraint for at least some of the observations, a Tobit estimator is used. In other words, the estimated model for the royalty rate, the proportion of company-owned stores, and the stake of the franchisor in downstream operation is

$$Y_i^j = \beta_0^j + \beta_1^j T_i + \sum_{k=2}^{n} \beta_k^j Z_{ki} + \varepsilon_i^j \qquad \text{if } 100 > \text{RHS} > 0, \tag{3}$$

and

$$Y_i^j = 0 \qquad \text{if RHS} \leq 0, \tag{4}$$

19. Franchisors often give a range of values for this variable. I use the average value, assuming that it represents an estimate of the amount of capital necessary to open an average outlet.

and

$$Y_i^j = 100 \qquad \text{if RHS} \geq 100, \tag{5}$$

for $j = 1$, 3, and 4. For the franchise fee, which is not bounded above, the model is

$$Y_i^2 = \beta_0^2 + \beta_1^2 T_i + \sum_{k=2}^{n} \beta_k^2 Z_{ki} + \varepsilon_i^2 \qquad \text{if RHS} > 0 \tag{6}$$

and

$$Y_i^2 = 0 \qquad \text{otherwise.} \tag{7}$$

Assuming that the error terms in the above equations are normally distributed, these equations can be estimated under maximum likelihood. In those cases where the upper bound never binds, such as for the royalty rate and for some of the measures of both the contract mix and the stake of the franchisor in downstream operations, the two-tail Tobit estimator defined by equations (3) to (5) reduces to the single-tail version used for the franchise fee, as in equations (6) and (7).[20]

Since the data are cross-sectional, equations were tested for heteroscedasticity, and corrected when appropriate.[21] Tests were also carried out to determine whether multiplicative sectoral dummies should be included in the regressions. In general, these dummies were not found to be significant and hence they were excluded from the analyses.[22] Finally, the requirement that firms be observed at two points in time at least five years apart implies that only relatively successful firms—that is, firms that survive at least five years—are included in this sample. This in turn raises the possibility of a selection problem. This is not addressed in the estimations for a number of reasons. First, as noted in Appendix A, it is necessary that the "bad" franchisors be profitable for separation to occur in this model. Hence there is a theoretical reason for excluding firms that fail from the sample under study here.[23] Second, it is not possible, using the available survey data, to

20. Note that results obtained under ordinary least squares (OLS) were very similar to the Tobit estimates.

21. See Maddala (1983) for a description of the methodology used here. The functional form used for σ was $\sigma = \exp(\alpha + \beta \cdot Type)$. I am grateful to Stephen Donald for suggesting this functional form. The test for heteroscedasticity then reduces to a test of the significance of β. The value of the heteroscedasticity coefficient β and its asymptotic t-ratio are reported for each equation at the bottom of the tables. Corrections were carried out whenever the β coefficient was found to be significant at a level of .10 or better.

22. These results are available from the author upon request.

23. In particular, one must be sure to exclude from the sample fly-by-night operators. The reason is that these firms are not "playing the same game." Unlike the set of firms considered here, they do not care about royalties, since they do not really intend to collect any. As a result,

infer franchisor survival. In other words, the absence of a franchisor from the survey in a given year cannot be interpreted as a sign of failure. Third, and most important, even if the sample under study excludes or underrepresents those firms at the bottom of the distribution of types, the theory would still predict, and hence we should still observe, over the remaining set of firms, the relations described in Section 2.

5. Empirical Results

Table 1 presents some descriptive statistics about initial royalty rates, franchise fees, number of company-operated outlets, and ex post growth rates. The franchisor in this sample who required the largest royalty payment when it first started franchising was Jazzercise, a fitness program company.[24] The firm with the largest franchise fee was Qual Krom, in the automotive service industry. The company that had the greatest number of company-owned outlets when it began franchising was Jack in the Box, a fast-food hamburger chain, with 780 units. The company that experienced the greatest level of growth in the present sample, according to *Growth1* (and *Type1*), was Sparks Tune-Up, while according to *Growth2* (and *Type2*), it was Fantasy Coachworks Ltd., a chain of "Auto Boutiques."

While this is not shown in the table, it is interesting to note that royalty rates and franchise fees did not tend to vary much over the five-year-plus period between the two observations on each firm. The average royalty rate declined from 7.04 to 6.65, and the average franchise fee went from 14.24 to 16.21 (thousands of 1980 dollars). Similarly, the number of company-owned outlets went down slightly from an average of 20.96 to 19.28. None of these differences is statistically significant.[25] These results are consistent with survey results reported in Lafontaine (1992b). They are also supported by Banerji and Simon (1991), who find that the contract terms of their 27 franchisors remained relatively stable during the five- to six-year period over which they observed them.

Table 1 also gives descriptive statistics for the various measures of the proportion of franchised stores and of the stake the firm has in downstream operations, that is, $\hat{\alpha} = \log(c_0)$, α_t and S_t when $t = 3$ and 5 years, respectively, as well as their actual proportion of company-owned stores and actual stake in downstream operations three or four years later, α_a and S_a, respectively.

Notice that since most firms operate units directly, and have positive royalty

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they may well choose a relatively high royalty rate and a low franchise fee. The latter might make it easier to sell a large number of franchises in a very limited amount of time, while the former makes the low franchise fee credible. In other words, these firms do not satisfy the sorting condition: They incur no loss of revenues from increasing r.

24. Five years later this fee was down from 31.5 percent to 20 percent.

25. The statistical tests involve calculating the mean and standard error of the individual differences across firms. Confidence intervals around the mean differences included zero for all reasonable confidence intervals, for all three variables.

Table 1. Descriptive Statistics for the Franchisors in the Sample

Variable	N	Mean	σ	Minimum	Maximum
Royalty rate (%)	125	7.04	3.87	0.00	31.50
Franchise fee ($000)	125	14.24	11.11	0.00	79.30
Company-owned units	125	20.96	101.65	0.00	780.00
$\hat{\alpha}$	125	1.11	1.38	−0.69	6.66
α_3 (3 years)	125	15.93	19.72	0.00	97.50
α_5 (5 years)	125	11.99	18.17	0.00	96.06
α_a (3–4 years)	125	23.96	27.02	0.00	100.00
S_3 (3 years)	125	29.56	21.33	0.00	99.19
S_5 (5 years)	125	24.20	19.49	0.00	98.71
S_a (3–4 years)	125	37.95	30.22	0.00	100.00
Growth1 (5 years +)	125	0.23	0.19	−0.22	0.83
Growth2 (last 2 years)	125	0.13	0.20	−0.44	0.69
Type1 (5 years +)	125	0.00	0.17	−0.44	0.42
Type2 (last 2 years)	125	0.00	0.20	−0.54	0.59
Years in business	125	6.50	9.60	0.00	52.00
Capital needed ($000)	125	96.53	171.50	1.00	1087.5
Input sales (%)	125	13.11	12.27	0.18	34.59
Days of training	66	13.13	11.64	2.50	62.50
Number of states	66	5.48	8.15	1.00	50.00

rates, the data are not really consistent with the notion that firms use strictly their contract terms (first type of equilibrium discussed above) or strictly their mix of company-owned and franchised outlets (second type of equilibrium) to signal their types. Hence, taking these data at face value, we are left only with the possibility that franchisors use both signals to differentiate themselves. However, the data in Table 1 might still be consistent with the first type of equilibrium if we assume that company ownership is used for purposes that have nothing to do with signaling. For example, one might argue that firms operate units directly to obtain information about their markets, or to provide training grounds for franchisees.[26] Similarly, the data in Table 1 might be consistent with the second type of equilibrium, where signaling is achieved completely through the contract mix, if one assumed that franchisors rely on royalty payments for reasons unrelated to signaling.

5.1 Main Regression Results

Regression results for the various dependent variables over the sample of 125 franchisors are found in Tables 2, 3 and 4. Table 2 shows the results pertaining to the terms of the franchise contract, r and F. Table 3 contains results relative to the contractual mix, α, while Table 4 shows results pertaining to the stake S

26. In Lafontaine (1992b), 44 of the 130 franchisors responding said that company-owned outlets serve as some sort of market information-gathering device, and 84 said that they were used as research centers and training grounds for new franchisees. (Note that multiple answers were allowed for this question; the total number of answers was 234, not 130.)

Table 2. Tobit Regression Results for Royalty Rates and Franchise Fees

Variable	Royalty	Franchise Fee	Royalty	Franchise Fee
Type1	−0.16	−3.00	—	—
	(−0.09)	(−0.57)		
Type2	—	—	−1.05	−0.65
			(−0.67)	(−0.14)
Years in business	0.07**	0.03	0.07**	−0.04
	(2.06)	(0.32)	(2.06)	(−0.34)
Capital required	−0.20	1.82***	−0.21	2.40***
	(−1.04)	(3.19)	(−1.07)	(3.93)
Discontinuations	0.69*	−2.62**	0.71*	−2.76**
	(1.69)	(−2.25)	(1.74)	(−2.21)
Input sales	0.15*	−0.13	0.15*	−0.07
	(1.91)	(−0.58)	(1.94)	(−0.30)
First franchised in				
1980	0.88	6.73**	0.83	5.11*
	(0.92)	(2.23)	(0.87)	(1.74)
1981	−1.16	4.87	−1.14	4.42
	(−1.14)	(1.61)	(−1.13)	(1.42)
1982	2.94***	2.79	2.88***	3.32
	(2.86)	(0.96)	(2.83)	(1.07)
1983	1.29	−1.87	1.26	−2.42
	(1.22)	(−0.63)	(1.22)	(−0.76)
1984	−0.16	5.28	−0.24	7.85*
	(−0.11)	(1.30)	(−0.17)	(1.85)
Constant	5.13***	18.03***	5.14***	17.76***
	(3.21)	(4.05)	(3.24)	(3.65)
Limit Observations	4	6	4	6
Non-Limit Observations	121	119	121	119
Log-likelihood	−320.41	−446.72	−320.12	−449.70
Hetero. Coeff. (β)	0.26	−1.17**	−0.18	−0.46
	(0.60)	(−2.55)	(−0.34)	(−1.22)

Note: Asymptotic *t*-statistics in parentheses. Results of two-tailed tests: ***$p < .01$; **$p < .05$; *$p < .10$

the firm has in downstream operations.[27] In all three tables, results obtained when growth is measured over the whole five or more years (*Type1*) are presented first, followed by those obtained when growth is measured over only the last two of the same five-years-plus period (*Type2*).[28]

The predictions from the signaling models—that the effect of franchisors' types on the royalty rates, or on their proportions of franchised stores, or on the

27. In terms of the growth variable, all equations were estimated under both a linear and a quadratic form. The two sets of results were equivalent. Also, since they were used as control variables and do not provide much insight to the problem at hand, the coefficients obtained for the six sectoral dummy variables are not reported in the tables.

28. Note that the initial royalty rates and franchise fees are not significantly negatively correlated in these data. This is consistent with results found in Banerji and Simon (1991) and Lafontaine (1992a), and it suggests that there might be rents left downstream. See also Mathewson and Winter (1985) and Kaufmann and Lafontaine (1994) on this issue.

Table 3. Tobit Regression Results for the Use of Company-Owned Outlets

Variable	$\hat{\alpha}$	α_3	α_a	$\hat{\alpha}$	α_3	α_a
Type1	−0.88	−11.34	−43.58***	—	—	—
	(−1.46)	(−1.22)	(−3.23)			
Type2	—	—	—	−0.34	−4.49	−22.83*
				(−0.64)	(−0.56)	(−1.75)
Years in business	0.04***	0.68***	1.08***	0.04***	0.74***	1.27***
	(3.56)	(3.94)	(4.58)	(3.68)	(4.15)	(4.46)
Capital required	0.12*	1.79**	1.57	0.13*	2.08**	0.39
	(1.96)	(2.05)	(1.39)	(1.92)	(2.00)	(0.25)
Discontinuations	0.10	1.55	3.16	0.13	2.18	0.64
	(0.71)	(0.75)	(1.20)	(0.96)	(1.02)	(0.19)
Input sales	0.05*	0.71*	0.58	0.06**	0.80*	0.48
	(1.86)	(1.83)	(1.18)	(2.04)	(1.89)	(0.75)
First franchised in						
1980	−0.30	−4.67	−5.85	−0.25	−3.91	−6.21
	(−0.92)	(−0.93)	(−0.85)	(−0.74)	(−0.77)	(−0.77)
1981	−0.76**	−10.78**	−4.92	−0.79**	−11.34**	1.80
	(−2.20)	(−2.08)	(−0.68)	(−2.31)	(−2.17)	(0.21)
1982	0.02	−0.74	−1.71	0.04	0.08	−8.91
	(0.05)	(−0.15)	(−0.27)	(0.11)	(0.02)	(−1.08)
1983	0.48	8.89*	10.12	0.43	8.53	5.39
	(1.49)	(1.84)	(1.59)	(1.27)	(1.62)	(0.64)
1984	0.15	4.12	6.64	0.06	3.58	5.11
	(0.32)	(0.59)	(0.74)	(0.12)	(0.46)	(0.44)
Constant	0.56	5.86	−0.99	0.39	2.68	8.97
	(1.06)	(0.74)	(−0.10)	(0.74)	(0.33)	(0.69)
Lower Limit Observations	20	20	24	20	20	24
Upper Limit Observations	0	0	3	0	0	3
Non-Limit Observations	105	105	98	105	105	98
Log-likelihood	−175.37	−460.02	−467.83	−177.54	−463.37	−485.73
Hetero. coeff. (β)	−1.13**	−1.44***	−1.86***	−0.71*	−0.74*	−0.14
	(−2.37)	(−2.92)	(−4.03)	(−1.68)	(−1.83)	(−0.25)

Note: Asymptotic t-statistics in parentheses. Results of two-tailed tests: ***$p < .01$; **$p < .05$; *$p < .10$.

Table 4. Tobit Regression Results for the Stake of the Franchisor in Downstream Operations

Variable	S_3	S_a	S_3	S_a
Type1	−19.65**	−50.96***	—	—
	(−2.19)	(−3.85)		
Type2	—	—	−9.15	−16.25
			(−1.19)	(−1.27)
Years in business	0.66***	1.09***	0.70***	1.28***
	(3.73)	(4.24)	(3.93)	(4.47)
Capital required	2.13**	1.56	2.09**	0.67
	(2.31)	(1.21)	(1.99)	(0.42)
Discontinuations	2.31	2.50	2.97	1.24
	(1.14)	(0.89)	(1.44)	(0.37)
Input sales	0.28	0.39	0.43	0.63
	(0.74)	(0.72)	(1.08)	(1.01)
First franchised in				
1980	−4.70	−5.41	−4.34	−5.64
	(−0.93)	(−0.75)	(−0.86)	(−0.72)
1981	−13.66***	−9.08	−14.98***	−5.47
	(−2.63)	(−1.20)	(−2.91)	(−0.66)
1982	−1.29	−3.00	−2.27	−10.00
	(−0.26)	(−0.43)	(−0.44)	(−1.22)
1983	9.43*	13.08*	8.73	6.08
	(1.87)	(1.85)	(1.62)	(0.72)
1984	−2.88	−0.05	−3.82	−0.90
	(−0.41)	(−0.05)	(−0.51)	(−0.08)
Constant	20.14**	19.36*	16.92**	23.60*
	(2.57)	(1.81)	(2.15)	(1.87)
Lower Limit Observations	3	4	3	4
Upper Limit Observations	0	3	0	3
Non-Limit Observations	122	118	122	118
Log-likelihood	−520.97	−549.99	−524.41	−564.33
Hetero. Coeff. (β)	−1.13***	−1.37***	−0.67*	−0.03
	(−2.83)	(−3.21)	(−1.78)	(−0.06)

Note: Asymptotic t-statistics in parentheses. Results of two-tailed tests: ***$p < .01$; **$p < .05$; *$p < .10$.

stakes they have in downstream operations should be positive—are clearly not borne out in these tables. In Table 2, one finds basically no relationship between the fees and the two measures of type. In Table 3, α relates negatively, not positively, to the measures of type, although in some cases the effect is not significantly different from zero. Results in Table 4 also indicate a negative rather than a positive relationship between the franchisor's type and the stake the franchisor initially has in downstream operations. Finally, Table 5 shows the partial correlations (rank correlations in parentheses) between firms' royalty rates and their reliance on company-ownership. The first column refers to the correlations holding *Type1* constant, while the second column shows the same correlations when *Type2* is held fixed. According to hypothesis C2, conditional on the type of the firm, these correlation coeffi-

Table 5. Correlation and Rank-Correlation Coefficients

	Type1	*Type2*
$\rho(r,\hat{\alpha}\|T)$	0.19**	0.19**
	(0.17)*	(0.16)*
$\rho(r,\alpha_3\|T)$	0.23***	0.23***
	(0.18)**	(0.17)*
$\rho(r,\alpha_a\|T)$	0.04	0.04
	(0.05)	(0.06)

Note: Rank correlation coefficients are shown in parentheses. The significance tests are performed as follows:

(i) Under normality, and under $H_0 : \rho = 0$, we have $(r\sqrt{n-2})/(\sqrt{1-r^2}) \sim t_{n-2}$, where r is the ordinary correlation coefficient, and n is the number of observations (here, $n = 125$).

(ii) For $n > 30$, $z = R\sqrt{n-1} \sim N(0,1)$, where R is the rank correlation coefficient. Note that this test does not require any distributional assumption.

Results of two-tailed tests: ***$p < .01$; **$p < .05$; *$p < .10$.

cients should be negative. But in fact the coefficients are positive, indicating that franchisors do not trade off royalty rates and the company ownership of outlets.[29] Overall then, one really finds no support in these data for the notion that franchisors use the terms of their franchise contracts and/or their contract mix as a way to signal their quality to potential franchisees.

Unfortunately, these negative results cannot easily be reinterpreted in a way that would support some alternative theory of franchising. The reason for this is that no other theory has implications concerning the effect of a firm's type, or ex post growth, on initial choices of royalty rates, franchise fees, and contract mix. However, some of the results relative to control variables bear on these alternative theories. We now turn to these results.

5.2 The Effects of Control Variables

The measures of franchisee and franchisor moral hazard, respectively the number of states in which a franchisor has established outlets and the number of days of training for new franchisees, are available for only 66 of the 125 franchisors. For this reason, these variables are not included in the regressions presented in Tables 2, 3, and 4. To determine how sensitive the results might be to the exclusion of these variables, the regressions were reestimated with these two variables for the subsample of 66 firms for which this information was available. The results are found in Appendix C in Tables C1, C2 and C3. They show that these two variables have a significant effect only on the actual proportion of company-owned outlets and the actual stake the firm has in

29. When the calculations were done holding fixed not only the type, but also the other variables used in the regressions, the correlation coefficients were still positive or nil.

downstream operations three or four years after it becomes involved in franchising. And the effects that are significant are consistent with doubled-sided moral hazard. For all other dependent variables, a joint test that the coefficients are zero could not be rejected. Furthermore, there is no case where the inclusion of these variables affects the results relative to the measures of type. In that sense, Tables 2, 3, and 4 provide a meaningful set of results relative to the signaling hypothesis despite the absence of these control variables in the regressions.

In terms of the input sales variable, one finds that it either has no effect or has a positive effect on royalty rates, franchise fees, and the use of company-ownership. None of these is consistent with the notion that these sales are used as an alternative source of revenues, or an alternative signal, by franchisors.[30] As noted earlier, one problem with this variable is that it contains no information as to what proportion of the sales from franchisors to franchisees is based on a contractual requirement, and what proportion is voluntary on the part of the franchisee. Given antitrust restrictions on tying, and especially the Court's decision in *Siegel et al. v. Chicken Delight, Inc.*, 448 F.2d 43 (9th Cir. 1971), it is likely that a large proportion of the observed sales from franchisors to franchisees are voluntary rather than compulsory.[31] The fact that franchisors cannot charge a price above the competitive price for voluntary sales could explain the results obtained here for this variable.[32,33]

30. In Lafontaine (1992a), input sales, measured in thousands of dollars per franchise, were found to have a negative effect on royalty rates and franchise fees (though the observed effects on the use of company ownership were similar to those obtained here). In the present article, input sales are measured as a proportion of average sales per franchised store. Lafontaine (1992a) uses a variable defined as one minus this proportion as a measure of franchisee's jurisdiction in the outlet. The effects of this variable on the franchise fee and the royalty rate are consistent with the results obtained in the present paper.

31. For a discussion of tying and franchising, see for example Hunt and Nevin (1975), Klein and Saft (1985) and Justis and Judd (1989:147–150). There is some evidence that the antitrust treatment of tying in the U.S. has affected franchisors' propensity to require franchisees to buy inputs from them. In particular, one finds that while U.S. franchisors typically resort to quality standards and lists of approved suppliers, franchisors in the U.K., where the approach towards vertical restrictions such as tying has been more "open-minded" (George, 1990:144), use tying much more often and to a much greater extent. (See Dnes (1992) for a number of franchising case studies and Mendelsohn (1990) for a description of franchising in the U.K.) Interestingly, in their survey of franchisees, Hunt and Nevin (1975) found that about 53 percent of franchisees believed the prices they paid for the inputs they bought from their franchisors were at or below market prices. The other 47 percent thought these prices were above market prices.

32. I thank the editor, Alan Schwartz, for making this point. Consistent with this argument, Sen (1993) finds that franchisors who *require* franchisees to buy certain inputs from them (captured by a dummy variable) have lower fees than those who do not.

33. There might also be an efficiency argument to be made for franchisors opting for royalty rates over input mark-ups: if the technology downstream is not one of fixed proportions, franchisees will substitute away from inputs they must buy at a relatively higher price. Royalty rates, on the other hand, will not lead to such distortions in franchisees' input buying behavior. However, the observation that U.K. franchisors rely much more on input sale requirements than U.S. franchisors do points toward antitrust restrictions rather than efficiency as the main reason for U.S. franchisors' limited use of input sales requirements.

In a signaling framework, the number of years in business prior to franchising could provide potential franchisees with information about the type of the firm, with the franchisor that has been in business for a longer period being more likely to be a high-value franchisor. In that case, high-type franchisors would not need to signal their type through royalties or company-owned outlets. This would imply that the number of years in business prior to franchising would have a negative effect on royalty rates and on the use of company-owned outlets, and a positive one on the franchise fee. But in all tables, one typically finds a positive and significant relationship between the number of years in business prior to franchising and the use of royalties or the use of company ownership. Hence results relative to this variable are also inconsistent with the signaling explanation for franchising.[34] However, they are supportive of the interpretation of years in business as a measure of the value of the trade name in the context of franchisor moral hazard.

As for the other control variables, one finds first that the risk variable has a positive effect (though generally not an effect that is significantly different from 0) on the royalty rates and on the use of company ownership, and a negative effect on the franchise fees. These results, which to some extent support the notion that franchisors provide insurance to their franchisees, are consistent with results from Banerji and Simon (1991), but opposite to those found in Lafontaine (1992a) and Martin (1988). Why this is so remains unclear at this point. Second, as in Lafontaine (1992a), one finds that a higher amount of capital required implies both a higher franchise fee and more company ownership. While the first effect is consistent with the notion that franchisors use franchising as a source of capital, the second effect is not. Brickley and Dark (1987) argue that this second effect can be explained by the increased contracting costs related to higher capital requirements: When franchisees must invest heavily in firm-specific assets, they face more risk and hence require a higher level of compensation. This would make franchising less attractive for firms whose concepts call for large capital expenditures. However, one way to reduce the risk to franchisees is to ask for a smaller franchise fee. Yet as we just saw, franchisors increase the franchise fee when the capital required to open an outlet goes up.

5.3 Conclusions

The results presented above do not support the notion that franchisors use the terms of their franchise contracts (royalty rates and franchise fees) or their capacity to operate outlets directly, or a combination of the two, to give

34. These results are the opposite of those reported for this variable in Lafontaine (1992a). The difference is attributable to the fact that the franchisors included herein are all just beginning to franchise. As a result, in the present article, the number of years in business captures the effect of the "% time not franchising" variable used in Lafontaine (1992a), that is, some notion of the value of the business format franchise. In other words, the longer the firms have been in business, the more time they have had to develop their business format, leading them potentially to ask for higher royalty payments. Also, these "older" firms are more likely to have opened a larger number of outlets, outlets that by definition are company-owned.

information to potential franchisees about the value of their franchise. Not only do the results related to the measures of type used here lead to this conclusion, but so do two other empirical patterns: (i) the fact that the terms of the contracts do not vary significantly over the five or more years separating the two observations on each firm (as noted in Gallini and Lutz (1992), in a signaling model, one would expect the royalty rates to decrease and the franchise fees to increase over time); and (ii) the fact that the number of years in business prior to franchising has a positive effect on royalty rates and on the use of company-owned outlets, while under signaling these effects should be negative.

The existing empirical literature on franchising further supports this "negative" conclusion vis-à-vis the signaling hypothesis in that it suggests that incentives issues and monitoring costs are a central issue in franchising. Brickley and Dark (1987), Lafontaine (1992a), Minkler (1991), and Norton (1988) all have found results suggesting that the terms of the contract, as well as the decision to franchise or operate directly, are influenced by factors related to franchisee and/or franchisor incentives.[35]

All this is not to say that franchisors do not have an informational advantage over potential franchisees when it comes to the value of their franchise or trade name, for they clearly do. Gallini and Lutz (1992) document this fact very well. But there are two main problems with the signaling explanation in the context of long-term relationships such as the ones involved here.

First, signaling via the terms of the franchise contract implies inefficiencies and a lack of flexibility for the duration of this contract. Hence it is likely to be very costly. Put differently, if royalty rates and franchise fees were used to provide information to franchisees about the fundamental value of the franchise, and given that franchisors get to choose the length of their contract, one would not expect the contracts to be set for such long periods. Similarly, signaling through the contract mix can be very costly. In Gallini and Lutz (1992), it involves a suboptimal effort level being put into the development of a particular location, the effects of which are irreversible. Without such high costs, however, using the contract mix as a signal would not be credible: Firms could modify their contract mix in a significant way once a number of contracts were signed. The main point here is that there likely exist more efficient ways for franchisors to reveal information about their quality level. For example, membership in the International Franchise Association is conditional on franchisors meeting certain criteria for admission and on their respecting a particular code of ethics. If the admission criteria for this associa-

35. Gallini and Lutz (1992) present some evidence supporting the signaling hypothesis. They find that the proportion of company-owned stores decreases in newly established franchised chains as the number of years since they began franchising increases—as it should if firms initially used company-ownership as a signal of their quality, and subsequently reduced their reliance on this signal as information about their value became known. But as some of the discussion in Section 4 suggests, these patterns should be interpreted with care in light of the fact that new franchisors necessarily start out as 100 percent company-owned chains. Given the composition of their samples, this problem is likely to explain also, at least in part, the results obtained in Lafontaine (1992a) and Martin (1988).

tion were "discriminating" enough, then simply belonging to this association might be taken as a credible way to convey information.[36]

Second, and more importantly, the kind of information the franchisee is seeking when considering buying a franchise is not limited to how good the franchisor is now, and/or how valuable the trade name is now, but includes information about how good they are likely to be in the future. To the extent that the future worth of the outlet will depend on the franchisor's future behavior, the franchisee will be looking for guarantees in the contract about this future behavior. In this context, royalties on sales, and possibly the company ownership of outlets, are used not as signals of an exogenously given and fixed franchisor value, but rather as incentive mechanisms that reassure the franchisee as to the future behavior of the franchisor, and therefore as to the future value of the franchise.[37]

More generally, the "negative" result obtained herein is interesting not only in what it tells us about franchising but also in what it reveals about the circumstances under which signaling, and information asymmetries, may or may not provide appropriate explanations for particular phenomena. Specifically, the results in this article suggest that even if there is evidence of asymmetric information, signaling cannot easily be used to explain the terms by which long-term relationships are governed, because the longer the relationship is (a) the more likely it is that alternative cheaper informational devices will exist, and, more importantly, (b) the more likely it is that the required information is not exogenously given and fixed but rather is a function of the future behavior of the informed party.[38] Hence one must look elsewhere, toward monitoring costs and other organizational efficiency arguments, to explain the nature and use of various types of long-term contractual arrangements.

Appendix A: Signaling Models of Franchising

This appendix discusses more precisely the signaling explanation in the context of franchising. The first part is concerned with the more basic model from Desai and Srinivasan (1990), Gallini and Wright (1990), and Tirole (1988), where all signaling is achieved through the terms of the franchise contract, namely royalty rate and franchise fee only. The second model, based on Gallini and Lutz (1992), allows franchisors to signal their types through their contract mix as well as the terms of their contracts. Since pooling equilibria can be ruled out by an appropriate choice of refinement, and, more importantly, since only separating equilibria imply differences in firms' behavior that can be tested empirically, only separating equilibria are discussed here.

36. From the finance literature, one finds evidence that such alternatives exist and that they are used: Balvers and colleagues (1988) find that firms' underpricing of new issues (the standard signal) is significantly reduced by an appropriate choice of investment banker and auditor. The reputations of the banker and auditor convey information about the value of the stock such that the issuing firm does not need to underprice the offer as much.

37. See Rubin (1978), Lal (1990) and Bhattacharyya and Lafontaine (1992) for this type of argument, and Lafontaine (1992a) for empirical evidence supporting it.

38. See Ippolito (1990) for a similar argument concerning signaling in the context of consumer durables.

A.1 Signaling Through the Terms of the Franchise Contract

Consider a risk-neutral franchisor with no established reputation, who obtains a trade name of high (h) or low (l) value from a common knowledge probability distribution, where the probability of getting a low-value trade name is θ. Inverse demand at the retail level is given by $p = p(q,T)$, where T again stands for the type of the franchisor, or, equivalently, for the value of the trade name. Alternatively, demand may be written as $p^h(q)$ and $p^l(q)$, with $p^h(q) \geq p^l(q)$ for all $q \geq 0$.

A competitive market for potential franchisees, who are also risk neutral, is assumed to exist. The franchise contract $c = (r,F)$ stipulates a royalty rate on sales, $r \in [0,1)$, and an up-front fee, $F \geq 0$, such that the franchisor's revenues from a franchised outlet over the duration of the contract are given by

$$R(r,F) = r \cdot p^i(q^i(c))q^i(c) + F, \qquad i = \text{h,l},$$

where $q^i(c)$ is the franchisee's choice of output over the duration of the contract, given that the contract is c and that the franchisor is of type i. The franchisees are assumed to learn their franchisor's type after signing their contract but before choosing their action. It is assumed that the contract cannot be renegotiated after the franchisee has observed the franchisor's type.[39] The franchisee's profits before payment of the franchise fee are

$$\pi^i(q^i) = (1 - r)p^i(q^i(c))q^i(c) - K, \qquad i = \text{h,l},$$

where K stands for the setup costs of the franchisee, which are assumed to be the same whether the franchisor's type is high or low. For notational simplicity, marginal costs at the outlet level are assumed to be 0. The value of π^i is assumed strictly concave in q^i.

Without asymmetric information, the contract that would maximize the franchisor's profits would have each type extracting all of the franchisee's profits through the fixed fee F. Any $r > 0$ would lead to a suboptimal quantity being chosen by the franchisee since the royalty rate increases marginal cost (or reduces marginal revenue) downstream.[40] With a fixed-fee contract, franchisees would be asked to pay a transfer price equal to the franchisor's marginal cost, and hence they would choose the optimal q^i. The franchise contracts would be given by $c^h = (0,\Pi^h)$ and $c^l = (0,\Pi^l)$ for the high- and low-value franchisors, where Π^h and Π^l are the first-best profits of the outlets, before payment of the fixed fee, when the trade names are high- and low-value, respectively.

39. It must also be that the value of the trade name, although observed ex post by both parties, is not verifiable by a third party. Otherwise, the optimal ex ante contract would simply have to be made contingent on this value to achieve the first best.

40. This is the standard double-marginalization argument. It might be argued that in an oligopolistic setting, positive royalty rates are beneficial to franchisors since they reduce output and hence bring firms closer to the collusive outcome. However, after franchisors have signed their contracts with franchisees, they extract their profits from the sales levels of their franchisees. As a result, they have no incentive to increase profits at the expense of lower sales.

With asymmetric information, in a separating equilibrium, both types are revealed. Given this, the low type's optimal contract is c^l by definition. But the franchisor with the good trade name cannot offer c^h since the franchisor with a low-value trade name would also choose c^h, and separation would fail. The "good" franchisor must offer a contract $\hat{c} = (\hat{r} > 0, \hat{F} < \Pi^h)$ that satisfies the franchisee's participation constraint and is less profitable than c^l for the low-value franchisor. A necessary condition for a set of separating contracts to exist in this context is that $d(R_r(r,T))/dT > 0$, where R_r is the derivative of the franchisor's revenues R with respect to the royalty rate r.

In order for the contract chosen by the high type to be unappealing to the low type, it must be that

$$\hat{r} \cdot p^l(q^l(\hat{c}))q^l(\hat{c}) + \hat{F} \leq \max [0, \Pi^l]. \tag{A1}$$

Notice that the low-value franchisor's revenues under $\hat{c}$ are necessarily nonnegative, since the franchise fee $\hat{F}$ is assumed to be nonnegative and sales are by definition nonnegative. Consequently, Π^l must be greater than 0 for a separating equilibrium to exist.[41] Hence, (A1) may be rewritten as

$$0 \leq \hat{r} \cdot \hat{p}^l\hat{q}^l + \hat{F} \leq \Pi^l, \tag{A2}$$

where $\hat{p}^l = p^l(q^l(\hat{c}))$ and $\hat{q}^l = q^l(\hat{c})$. If this condition is met, then the pair of contracts $(\hat{c}, c^l)$ signals perfectly. The franchisee, knowing that the firm offering $\hat{c}$ has a high-value trade name, assigns an ex post probability $g(\hat{c}) = 1$ to the franchisor being a good type and accepts the contract if $\hat{F} \leq (1 - \hat{r})\hat{p}^h\hat{q}^h - K$. After eliminating dominated strategies,[42] the unique separating equilibrium contract for the high-value franchisor, $c^* = (r^*, F^*)$, solves

$$\max_{r,F} [r \cdot p^h(q^h(c))q^h(c) + F],$$

subject to

$$r \cdot p^l(q^l(c)) \cdot q^l(c) + F = \Pi^l \tag{A3}$$

and

$$(1 - r)p^h(q^h(c)) \cdot q^h(c) - K - F \geq 0. \tag{A4}$$

Notice that from (A3) and the fact that royalty payments are nonnegative, the franchise fee F^* in c^* can never be greater than Π^l.[43]

41. In other words, low-value franchises must still be profitable, otherwise separation would never occur. As a result, an empirical test of this model cannot be based on a definition of types that is derived from a notion of survival.

42. See Tirole (1988: chap. 11) for an introduction to the refinements literature, and Cho and Kreps (1987) and the references therein for more details.

43. Also, the franchisor with type h must prefer c^* to c^l. But that is implied by (A3) and the fact that $r \cdot p^h(q^h(c))q^h(c) \geq r \cdot p^l(q^l(c))q^l(c)$.

The solution to the above program gives two schedules, one for r and one for F, as functions of the franchisor's type T: For r, we find that $r^h > r^l = 0$; for F, that $F^h < F^l = \Pi^l$. Extending to a continuum of types, the schedule for r would be increasing in T, with the absolute lowest choosing $r = 0$, while the schedule for F would be decreasing in T.

A.2 Signaling Through the Contract Terms and the Contract Mix

The above discussion focused on a single franchisor designing a contract for a single franchisee. In reality, franchisors have a number of outlets and while they tend to franchise most of them, they also generally operate some of them directly. I assume that in company-owned outlets the franchisor keeps control over q (and therefore p), and a hired manager, who is paid a fixed wage, supervises the outlet.[44] Note that with a competitive market for such managers, the fixed wage to be paid to each manager will be independent of T.

It is necessary to impose a cost related to company ownership, for example a higher capital cost, to prevent firms from operating all of their units in this context.[45] This is because the problems related to asymmetric information are assumed not to occur in a vertically integrated firm.[46] Since signaling involves costly distortions, without some sort of cost attached to company operation, high-value firms in this model would find it in their best interest to operate all of their outlets directly (while low-value franchisors would be indifferent between franchising under c^l and operating directly).

Assume the total number of units in the chain, n, is fixed, and define α^i as the proportion of company-operated stores in a given franchise chain. A separating equilibrium in this case could be characterized by $\hat{\alpha}^h > 0$ and a contract $\hat{c} = (\hat{r},\hat{F})$ for franchisors with a high-quality trade name, and $\alpha^l = 0$ and $c = c^l$ for the others. Low-quality franchisors would not want to mimic this offer as long as, for a given $\hat{\alpha}^h$,

$$\hat{\alpha}^h \cdot (\Pi^l - Z^l) + (1 - \hat{\alpha}^h)(\hat{r} \cdot \hat{p}^l \cdot \hat{q}^l + \hat{F}) \leq \Pi^l,$$

where $\Pi^l \geq 0$ as before, and Z^i, i = h,l, represents the increased capital cost associated with company operation for the high- and low-value franchisor, respectively. To ensure that a separating equilibrium would exist if signaling was achieved strictly through the contract mix, I assume that it is less costly for the high type to increase α than it is for the low type. Combined with the sorting condition imposed above, this also guarantees the existence of a

44. What is necessary is that the franchisor be able to dictate the quantity to be produced in company-operated outlets, and that the manager's revenues not depend on the "quality" of the franchise. One way to guarantee that managers do not care about the quality of the franchise is to offer them a fixed wage.

45. Gallini and Lutz (1992) do not need to introduce a higher capital cost in their model since they argue that the cost of company ownership is the inefficiency introduced by managers who cannot appropriate increases in the resale value of their outlet that are due to their good management. As a result, they pick a lower level of effort than franchisees do. But since I do not incorporate the choices of effort level in the following discussion, it is simpler to think in terms of a capital cost.

46. This assumption is quite customary; see, for example, Crocker (1983).

separating equilibrium when a combination of r and α is used to signal the franchisor's type. The contract offered by the high-quality franchisor would again have to satisfy the franchisee's participation constraint, that is,

$$(1 - \hat{r})\hat{p}^{h} \cdot \hat{q}^{h} - K \geq F.$$

For a given α^{h}, the set of separating equilibria implied by these conditions can be reduced to a singleton through the elimination of dominated strategies. This unique separating equilibrium contract $c^{\alpha^{h}} = (r^{\alpha^{h}}, F^{\alpha^{h}})$ is the solution to

$$\max_{r,F}\{\alpha^{h}(\Pi^{h} - Z^{h}) + (1 - \alpha^{h})\,[r \cdot p^{h}(q^{h}(c)) \cdot q^{h}(c) + F]\},$$

subject to

$$\alpha^{h}(\Pi^{l} - Z^{l}) + (1 - \alpha^{h})\,[r \cdot p^{l}(q^{l}(c)) \cdot q^{l}(c) + F] = \Pi^{l} \tag{A5}$$

and

$$(1 - r)p^{h}(q^{h}(c))q^{h}(c) - K \geq F. \tag{A6}$$

The separating equilibrium might take one of two forms in this case. First, there exists an $\tilde{\alpha}$ such that $c = c^{h}$ when $\alpha^{h} \in [\tilde{\alpha},1]$. In other words, all signaling can be achieved through the contract mix rather than the contract terms. In this case, we have that $\alpha^{h} = \tilde{\alpha}$ and $\alpha^{l} = 0$, so that $\alpha^{h} > \alpha^{l}$. Extending to a continuum of types again, if signaling is a consideration in the choice of contract mix, and *all* signaling is achieved through the choice of contract mix, then we should find that α is increasing in T.

The second type of equilibrium occurs for values of α^{h} such that $0 < \alpha^{h} < \tilde{\alpha}$. In this case, $r > 0$ becomes necessary again to achieve separation. In other words, high-value franchisor's use a combination of r and α to signal his type. With this kind of equilibrium, the signal is the franchisor's stake (S) in the whole chain. If the contract mix and/or royalty rates are used as signaling devices, we should find that this stake increases with T. In addition, for a given value of T, r and α should be negatively correlated.

Appendix B: Data Sources and Variable Definitions

As noted above, the data used in this paper are obtained primarely from *Entrepreneur Magazine*'s yearly "Franchise 500" surveys. These surveys give information on, among other things, royalty rates, advertising fees, and franchise fees for all franchisors surveyed each year.[47] Because the royalty rates and franchise fees used in the empirical analyses should represent all the

47. At a point in time, the royalty rate and franchise fee demanded by a franchisor tend to be the same for all potential franchisees. This is not clear from the *Entrepreneur*'s surveys: Some of the franchisors say that their fees vary, while others give ranges. Lafontaine (1992a) analyzes these statements and concludes that the fees are relatively constant across franchisees at a point in time. In this article, cases where fees were said to vary were eliminated from the data since one cannot assign fees to these firms. However, averages were used for those that gave a range.

variable and fixed payments from the franchisee to the franchisor, respectively, advertising fees given as a percentage of sales are added to the stated royalty rate to generate the notion of royalty rate used in this article. When the royalty payments and/or the advertising fees are given as fixed amounts per time period, they are discounted and added to the franchise fee.[48] Finally, all franchise fees are in 1980 U.S. thousands of dollars.[49] Royalty rates and other proportions are in percentages.

In terms of the proportion of company-owned stores and the stake the franchisor has in downstream operations, both α_a and S_a are measured two years before the end of the five-year-plus period separating the two observations on each firm. This is because in each survey year t, the number of franchised and company-owned outlets is given for years t, $t-1$, and $t-2$. Since I observe each firm in two surveys at least five years apart, I can use the data for $t-2$ in the second observation to construct α_a and S_a. By so doing, I eliminate the need to observe the firm in another survey between the two original ones, which would reduce my sample size. The fact that the number of years elapsed between the beginning of franchising and the time I observe α_a and S_a varies a little across firms (the number of years is either three or four for 120 firms out of 125) is not a problem in the regressions since I control for the year in which the firm began franchising. Note that the royalty rate in the final survey is used in combination with α_a to generate S_a.

Finally, some of the data used in the analyses are obtained on a sectoral basis from the U.S. Dept. of Commerce's *Franchising in the Economy* (U.S. DOC, 1988). This includes data on input sales from franchisors to franchisees, which are measured as the total amount of such sales divided by total sales of franchised outlets in the sector. This source also provides discontinuation rates, and the average sales level of franchised and company-owned stores. The 14 business format franchising sectors defined by the DOC are as follows: Automotive Products and Services; Business Aids and Services; Construction, Home Improvement, Maintenance, and Carpet Cleaning; Convenience Stores; Educational Products and Services; Restaurants; Hotels, Motels, and Campgrounds; Laundry and Drycleaning Services; Recreation, Entertainment, and Travel; Rental Services (Auto-Trucks); Rental Services (Equipment); Nonfood Retailing; Food Retailing, Non-convenience; Miscellaneous.

In the case of two sectors, Business Services and Restaurants, the average sales data are also broken down by subsectors. For Business Services, there are six subsectors: Accounting and Collection Services, Employment Services, Printing and Copying, Tax Preparation, Real Estate, and Miscella-

48. In reality, fixed up-front fees and ongoing fixed payments are different: The obligation to pay the latter disappears if the outlet goes out of business during the contract period. Since failure rates are low in franchising [according to the U.S. Dept. of Commerce (1988), the number of discontinued outlets in 1986 was 7,934 out of 246,664 outlets, for a discontinuation rate of 3.2 percent per year], and ongoing fixed payments are also uncommon (4 cases out of 125 in the present sample), I disregard this difference. The discount rate used was 10 percent (fees are in nominal dollars). Given the small number of cases where ongoing fixed payments occur, results are not sensitive to these data manipulations.

49. Some of the franchisors in the sample are Canadian. Their franchise fees were transformed to $U.S.

neous. For Restaurants, there are eight subsectors: Chicken; Hamburgers, Franks, Roast Beef; Pizza; Mexican; Seafood; Pancakes and Waffles; Steak and Full Menu; and Sandwiches and Others.

Finally, because there were often only a few firms in the sample in each of the sectors, the dummy variables identify only six separate sectors, namely: Automotive Services, Business Services, Construction and Maintenance, Restaurants, Non-food Retailing, and Non-convenience Food Retailing. The other firms form a miscellaneous sector.

Appendix C: Tobit Results for the Subsample of 66 Franchisors

Table C1. Tobit Results for Royalty Rates and Franchise Fees

Variable	Royalty	Franchise Fee	Royalty	Franchise Fee
Type1	−1.51	−0.90	—	—
	(−0.67)	(−0.16)		
Type2	—	—	−0.12	−5.58
			(−0.06)	(−1.13)
Years in business	0.04	−0.19	0.12**	−0.20
	(0.53)	(−1.43)	(2.08)	(−1.46)
Capital required	0.84	10.21***	−0.50	10.16***
	(0.90)	(6.14)	(−0.86)	(6.18)
Discontinuations	0.74	−3.62***	0.97*	−3.41***
	(1.54)	(−2.86)	(1.87)	(−2.70)
Input sales	0.14*	−0.18	0.17**	−0.18
	(1.76)	(−0.86)	(1.96)	(−0.89)
First franchised in				
1980	−0.54	−1.43	0.77	−1.49
	(−0.39)	(−0.50)	(0.65)	(−0.53)
1981	−1.81	6.89	−2.10	6.61
	(−1.03)	(1.66)	(−1.22)	(1.61)
1982	1.89	−2.43	2.60**	−2.13
	(1.56)	(−0.79)	(2.01)	(−0.70)
1983	−0.87	−5.00*	0.62	−4.50
	(−0.70)	(−1.65)	(0.52)	(−1.55)
1984	−0.59	4.31	0.05	4.39
	(−0.43)	(1.14)	(0.03)	(1.20)
Days of training	−0.01	0.04	0.01	0.04
	(−0.16)	(0.44)	(0.40)	(0.49)
Number of states	−0.01	−0.04	−0.01	0.01
	(−0.24)	(−0.29)	(−0.27)	(0.04)
Constant	6.45***	19.05***	4.25**	18.34***
	(3.33)	(3.83)	(2.11)	(3.70)
Limit Observations	2	1	2	1
Non-Limit Observations	64	65	64	65
Log-likelihood	−157.75	−218.86	−160.64	−218.23
Hetero. Coeff. (β)	−2.54**	−0.78	−0.17	1.10
	(−2.03)	(−1.04)	(−0.20)	(1.39)

Note: Asymptotic t-statistics in parentheses. Results of two-tailed tests: ***$p < .01$; **$p < .05$; *$p < .10$.

Table C2. Tobit Results for the Use of Company-Owned Outlets

Variable	$\hat{\alpha}$	α_3	α_a	$\hat{\alpha}$	α_3	α_a
Type1	−0.93	−12.83	−51.28***	—	—	—
	(−0.93)	(−0.94)	(−3.51)			
Type2	—	—	—	−0.99	−12.55	−19.81
				(−1.13)	(−1.04)	(−1.05)
Years in business	0.07***	1.17***	1.16***	0.07***	1.17***	1.50***
	(2.95)	(3.57)	(3.27)	(2.94)	(3.56)	(4.11)
Capital required	0.21	3.60	−2.22	0.21	3.69	−5.16
	(0.86)	(1.11)	(−0.55)	(0.89)	(1.14)	(−1.02)
Discontinuations	0.15	2.86	2.51	0.17	3.18	5.63
	(0.68)	(0.97)	(0.79)	(0.80)	(1.07)	(1.55)
Input sales	0.09**	1.18**	0.57	0.09**	1.21**	0.69
	(2.53)	(2.38)	(1.19)	(2.57)	(2.41)	(1.19)
First franchised in						
1980	−0.92*	−13.16*	6.64	−0.96*	−13.78**	16.92
	(−1.82)	(−1.93)	(0.80)	(−1.91)	(−2.02)	(1.61)
1981	−0.41	−7.30	−0.13	−0.49	−8.38	−7.43
	(−0.57)	(−0.76)	(−0.01)	(−0.69)	(−0.87)	(−0.55)
1982	−0.30	−4.93	4.69	−0.32	−5.17	23.52***
	(−0.58)	(−0.69)	(0.60)	(−0.60)	(−0.73)	(2.98)
1983	0.25	4.10	23.65***	0.21	3.43	23.72***
	(0.48)	(0.59)	(3.65)	(0.42)	(0.51)	(3.30)
1984	−0.45	−5.55	25.86***	−0.53	−6.70	46.20***
	(−0.70)	(−0.63)	(2.99)	(−0.84)	(−0.78)	(5.60)

(continued)

Table C2. (*Continued*)

Variable	$\hat{\alpha}$	α_3	α_a	$\hat{\alpha}$	α_3	α_a
Days of training	−0.00	−0.08	0.39*	−0.00	−0.05	0.81***
	(−0.34)	(−0.42)	(1.77)	(−0.18)	(−0.26)	(3.24)
Number of states	−0.00	0.09	−0.86*	0.01	0.23	−0.26
	(−0.06)	(0.30)	(−1.86)	(0.40)	(0.73)	(−0.51)
Constant	−0.01	−2.50	−3.88	−0.10	−3.40	−22.38*
	(−0.02)	(−0.22)	(−0.32)	(−0.12)	(−0.30)	(−1.66)
Lower Limit Observations	11	11	12	11	11	12
Upper Limit Observations	0	0	1	0	0	1
Non-Limit Observations	55	55	53	55	55	53
Log-likelihood	−97.77	−238.27	−236.78	−97.56	−238.17	−249.37
Hetero. Coeff. (β)	−0.55	−0.90	−3.24***	−0.87	−0.86	−5.71***
	(−0.82)	(−1.31)	(−3.62)	(−1.19)	(−1.13)	(−2.79)

Note: Asymptotic *t*-statistics in parentheses. Results of two-tailed tests: ***$p < .01$; **$p < .05$; *$p < .10$.

Table C3. Tobit Results for the Stake of the Franchisor in Downstream Operations

Variable	S_3	S_a	S_3	S_a
Type1	−12.53	−61.79***	—	—
	(−0.83)	(−3.70)		
Type2	—	—	−10.42	−11.39
			(−0.80)	(−0.81)
Years in business	0.95***	0.99***	0.94***	1.40***
	(2.63)	(2.59)	(2.61)	(3.38)
Capital required	3.16	−1.72	3.32	−5.33
	(0.86)	(−0.39)	(0.90)	(−0.92)
Discontinuations	4.97	6.73**	5.32	6.44*
	(1.54)	(1.99)	(1.63)	(1.70)
Input sales	0.74	0.32	0.76	0.46
	(1.37)	(0.67)	(1.40)	(1.09)
First franchised in				
1980	−14.89*	13.35	−15.37**	20.36**
	(−1.95)	(1.57)	(−2.02)	(2.38)
1981	−19.52*	−27.26**	−20.41*	−28.29**
	(−1.79)	(−2.03)	(−1.87)	(−2.18)
1982	−8.82	10.90	−9.17	31.14***
	(−1.09)	(1.33)	(−1.13)	(3.26)
1983	0.82	28.42***	−0.06	31.26***
	(0.10)	(4.29)	(−0.01)	(4.72)
1984	−13.82	26.21***	−15.03	45.09***
	(−1.40)	(2.78)	(−1.54)	(4.62)
Days of training	0.03	0.57**	0.06	1.14***
	(0.15)	(2.53)	(0.30)	(4.59)
Number of states	0.26	−0.65	0.37	−0.13
	(0.77)	(−1.48)	(1.08)	(−0.59)
Constant	10.87	4.42	9.86	−12.38
	(0.88)	(0.37)	(0.79)	(−0.94)
Lower Limit Observations	1	1	1	1
Upper Limit Observations	0	1	0	1
Non-Limit Observations	65	64	65	64
Log-likelihood	−281.71	−282.67	−281.73	−293.22
Hetero. Coeff. (β)	−0.88	−4.12***	−0.76	−5.39***
	(−1.38)	(−3.67)	(−1.17)	(−2.67)

Note: Asymptotic t-statistics in parentheses. Results of two-tailed tests: ***$p < .01$; **$p < .05$; *$p < .10$.

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