Information structure and contractual choice in Franchising

Abstract

We develop a simple model to explain the co-existence of company owned and franchised outlets in business format franchising. We assume that there are differences in outlet quality in regards to their profitability. The franchiser knows the exact potential of a specific location while the franchisee knows only the distribution of the location parameter. We show that the franchiser would like to open a company-owned store at a more profitable location leaving the less profitable ones for franchised outlets. Our theoretical model is able to explain the many empirical findings of previous research.

Journal of Economic Literature Classification Numbers: D82, D23, L14.

Keywords: Franchising, Moral Hazard, Location Quality.

Introduction

Business format franchising is characterized by the co-existence of company owned stores and franchised outlets. While the existing literature has offered different explanations behind the rationale for franchised outlets, - see Cheung (1969), Eswaran and Kotwal (1985), Lafontaine (1992), Bhattacharya and Lafontaine (1995) among others - there is a dearth of research explaining why firms open both company-owned stores and franchised stores at the same time. A recent paper that addresses the co-existence of both types of stores is Brown (1998).

In this paper we build a model of franchising based on the very plausible and intuitive assumption of differences in location of stores. Martin (1988) made the conjecture that variations in location profitability may dictate the choice of institutional form. He says "heterogenous locations also imply differences in expected profitability and risk by location. If the franchiser is risk neutral or risk averse, that person will retain locations with high expected profitability since the opportunity cost of franchising is higher for these locations. The firm's cost of franchising rises relative to the cost of monitoring company owned outlets as expected profitability increases." A quick look at Table 1 shows that the average sales at company-owned stores exceed those in franchised outlets for every category listed.

[Table 1 about here]

Martin (1988) shows in his Table 1 on page 957, that not only are sales higher in company-owned stores, the rate of growth of sales is also higher in company-owned stores as compared to franchised stores. The ratio of compound growth rates in sales in company-owned stores to the growth rate of sales in franchised stores is 1.27. While Martin does provide some empirical evidence in support of the above conjecture, he does not provide a clear theoretical argument as to why this is the case. As Lafontaine (1992) points out - "One major problem with Martin (1988) or other similar empirical exercises analyzing franchising such as Goldberg (1983), Brickley and Dark (1987), Brickley, Dark and Weisbach (1991) and Norton (1988) is that none of these models can directly explain contract mixing: with homogenous outlets the models discussed above all lead to chains that are fully franchised or fully company-owned, not to a mixture of contracts. With heterogenous outlets, one should find firms using a variety of contracts, one for every different situation, not simply one franchise and one "wage" contract for managers of company-owned stores."

In this paper we develop a theoretical model which shows how location profitability dictates whether to open a company-owned or a franchised store. In doing so we formalize the idea contained in Martin (1988) and extend his model in different ways. We assume that there are variations in location quality, in the sense that certain locations are more lucrative than others because they have a greater potential to be profitable. In addition only the franchiser knows the exact potential of a true location. The potential franchisee or the manager knows only the distribution of location quality. We show that the franchiser will choose to open a company-owned store at a more profitable location and a franchised outlet at a less profitable one. This view of why both company-owned and franchised outlets co-exist accords well with reality and is borne out by previous research such as Lafontaine(1992), Brickley & Dark(1987), Mathewson & Winter(1985). Section 2 presents our model. Section 3 presents the contract problem and the main theoretical results, and Section 4 concludes.

The Model

The environment consists of two kinds of economic agents. One kind of agents are the owners of a brand-name or a franchise which is valued by the market. The other kind of agents are the ones who work for these owners in a project or outlet. For brevity we will refer to the first kind of agents as the “company” and the second kind of agents as the “manager”. At the beginning of a production period the company and the manager come together to start a venture or an outlet and sign a contract which specifies the way in which revenue from the outlet is going to be shared among them. The production or the revenue generating process requires inputs from both these agents. We will refer to the contribution of the company and the manager in the production process as “supervision” and “effort” respectively. The revenue generated in an outlet is given by

$$Y = F(e,s;t) \ , \qquad \#$$

where e and s denote the amount of the effort and supervision provided by the manager and the company respectively. Effort provided by the manager can be interpreted the his level of efficiency or how conscientiously he carries out the work required of him in the operation of an outlet. Supervision provided by the company can be thought of as advertizing, quality control checks and other support services which are critical in maintaining the value of the brand-name and hence revenue. The other factor affecting the revenue of the outlet is called the signal(t) or type of the outlet which is non-contractible. However the type(t) is observed by the company while the manager only has a prior distribution over the same. This distribution is denoted by $\Phi(t)$.

Assumption 1: *The revenue function obeys the following conditions*: $F_1(e,s;t),\ F_2(e,s;t) > 0$, $F_{11}(e,s;t),\ F_{22}(e,s;t) < 0$ *and* $F(0,s;t) = F(e,0;t) = 0$.

Assumption 2: *The type of an outlet* $t \in [0,\ T]$. *We assume that the location parameter is distributed uniformly in the range* $[0, T]$. *Revenue is increasing in t within this interval i.e.*, $F(e,s;t) \to 0$ *as* $t \to 0$, $F_3(e,s;t) > 0$ *for all* $t > 0$. *In addition the type of outlet is complementary to both output and supervision i.e.*, $F_{13}(e,s;t),\ F_{23}(e,s;t) > 0$. *We further assume that* $F_{33}(e,s;t) > 0$, *i.e.*, *the production function is convex in the location quality parameter*, *t*.

$F_i(.)$ and $F_{ij}(.)$denote the first and second partial derivatives of the revenue function with respect to the ith and jth arguments. The first assumption says that the revenue function obeys standard concavity conditions and that revenue requires the presence of both inputs effort and supervision. The second assumption helps us in interpreting the role of outlet type t on the revenue from an outlet. Assumption 2 says that outlet type t belongs to an interval where 0 signifies the worst possible outlet type and T signifies the best possible outlet type with regards to their profitability. Everything else being the same the revenue from a better outlet is higher. In addition we assume that type of outlet is complementary to effort and supervision. Finally we are assuming that as location quality improves, output increases *at an increasing rate*. Given the description of the revenue generating process of an outlet we can see that there are two sources of moral hazard, one arising from the provision of effort on the part of the manager and the other arising from the provision of supervision on the part of the company. The provision of these inputs by the manager and the company would depend on their opportunity costs.

Assumption 3: *Let* $v(e)$ *denote the disutility of providing effort for the manager*. *Let* $h(s)$ *denote the opportunity cost of providing supervision for the company*. *The functions* $v(.)$ *and* $h(.)$ *satisfy the following properties*: $v(0) = h(0) = 0$; $v^{'}(.),\ h^{'}(.) > 0$ *and* $v^{''}(.),\ h^{''}(.) > 0$.

The assumption above says that the cost of providing effort and supervision are positive and increasing. This assumption guarantees an interior solution to the contract problem we are going to discuss soon. The following assumption summarizes the payoffs of the manager and the company.

Assumption 4: *The company is risk neutral*. *The manager is risk averse and his payoff is described by a strictly increasing and concave utility function* $u(w)$ *where w denotes the payment received by the manager on entering the contract with the company*. *The reservation wage of the manager at any outlet type t is given by* $K(t)$. *The reservation utility of the manager is* $u(K(t))$ *which will be denoted as* $\bar{u}_t$.

At this point we should point out that one of the major difference of our paper from rest of the literature is that we allow the reservation utility of the manager to vary with the outlet type t. It is quite plausible that if an outlet is located at a highly profitable location then the outside wage that the manager will be able to receive from an alternative form of employment will also be higher. We are going to investigate how the behavior of $K(t)$ affects the contracts written.

Assumption 5: $F_3(e,s,t) \geq K^{'}(t) > 0$ *for any* $(e,\ s)$.

This says that with an improvement in the location quality, output increases at a faster rate than does the reservation wage of the manager. We make the above assumption to ensure that it is potentially feasible for the company to give a better wage offer to the manager at any outlet type t. This condition may also be interpreted as the cost of finding alternative employment for the manager. We will show later that if this condition is violated, then the company will not find it profitable to open a company-owned store at any location and all the stores opened will be franchised.

Now we can study the nature of franchise contracts that will be written between the company and the manager. We will focus our attention on linear contracts as they are most commonly observed contractual form and also satisfy desirable optimality properties as described in Bhattacharya & Lafontaine(1995). Before we state the contract problem let us characterize the kinds of contracts we are likely to encounter. Let α denote a fixed payment made by the manager to the company and β denote the share of the company in the revenue of an outlet. The payoff to the company from any contract is $[\alpha + \beta\, F(e,s;t)]$ and the payoff to the manager is $u[-\alpha + (1-\beta)F(e,s;t)]$. Depending on the value of α and β we will call the contracts as follows:

- Fixed license fee contract: $\alpha > 0, \beta = 0$.
- Franchise contract: $\alpha \geq 0, \beta \in (0,1)$.
- Company ownership: $\alpha < 0, \beta = 0$.

Optimal contract

Now we proceed to study the contract problem faced by the company if it has private information regarding the type of the outlet. The manager has a subjective probability distribution about the type of the outlet given by $\Phi(t)$. In this scenario a company has two distinct options:(1) to open a company owned outlet or (2) to open a franchised outlet. At a company owned store the company's problem is to hire a manager to oversee the work. The manager gets paid a fixed salary making the company the residual claimant.

A: Hiring a manager for a company owned store

Since the company is the residual claimant in the company owned store there is no moral hazard on the part of the company. At a company owned store the company pays a fixed remuneration to the manager. This would normally lead to a moral hazard problem on the part of the manager. He has no incentive to provide the optimal effort at a fixed wage since providing effort is costly. In fact since the payoff to the manager is the wage minus the disutility of effort $(u(W) - V(e))$ he would provide the minimum amount of effort possible. Let e_t^* denote the level of effort that the company wants to implement at an outlet type t. The company can extract the desirable effort from the manager by paying an efficiency wage W_t^* and writing a forcing contract of the following form: If $e \geq e_t^*$ the manager gets paid the efficiency wage W^* but if $e < e_t^*$ then the manager's employment is terminated. In that case the manager leaves and accepts an alternative employment which gets him his reservation wage at that location. Faced with a forcing contract of this form, the manager will put forth the optimal effort e_t^* (Schotter,1998). However, the company will have to monitor the manager to detect shirking. Let the monitoring cost be M. The manager will not shirk as long as the payoff from providing the optimal effort exceeds that from being found shirking and getting fired. Let $p(e)$ denote the probability of the manager getting caught if he is shirking. Denote by $p(0) = \bar{p}$ the probability of the manager being detected for putting in zero effort. As the manager provides more effort the probability of detection goes down i.e., $p'(e) < 0$. In addition we will assume that the change in the probability becomes progressively smaller which means that $p''(e) > 0$.

[Figure 1 about here]

The next proposition derives a sufficient condition for an extremely simple characterization of the efficiency wage that has to be provided by the company to implement the desirable level of effort from the manager.

Proposition 1: *There exists an efficiency wage W_t^* for any effort level e_t^* the company wants to implement. The efficiency wage satisfies the following equation*:

$$u(W_t^*) = \bar{u}_t + \frac{v(e_t^*)}{p(\tilde{e})} \qquad \#$$

where $\tilde{e} = \arg\max_e \, [\, p(e)\bar{u}_t + (1 - p(e))u(W) - v(e)]$.

Proof: See the appendix. [End Proof]

Now we can state the contract problem faced by the company when it wants to open a company owned store. The company will solve the following problem:

$$\max_{e,s,W} \Pi^O(t) = F(e, s; t) - h(s) - W - M ,$$

subject to equation (2). Notice that with the efficiency wage the company will automatically satisfy the participation constraint of the manager. Let the solution to the above problem be (e_t^*, s_t^*, W_t^*). The profit from a company owned store is

$$\Pi^O(t) = F(e_t^*, s_t^*; t) - h(s_t^*) - W_t^* - M .$$

The change in the profit from a company owned store due to a change in outlet type is given by

$$\frac{\partial \Pi^O(t)}{\partial t} = F_3(e_t^*, s_t^*; t) - K'(t) \geq 0 . \qquad \#$$

How about the curvature of the profit function with respect to the location parameter, i.e. what is the sign of the second derivative? By assumption $F(.)$ is convex. This implies that the profit function will be convex if (1) $K(t)$ is linear (implying $K''(t)$ is zero) or (2) if $K''(t)$ is concave. On the other hand the profit function will be concave for those types where $K(.)$ is convex in t. We refrain from imposing further restrictions on $\Pi^O(t)$ and will consider separate cases where it is convex and where it is concave.

B: Opening a Franchised outlet

Now lets look at the profits of the company from a franchised outlet at same outlet type t. The usual franchise contract takes the form of a fixed franchise fee α which is a fixed payment made by the franchisee to the company and a royalty rate β which is the share of the company in the revenue of the outlet. Since the type of the outlet t is non contractible the terms of the contract cannot be made contingent on t. The problem faced by the company now is to maximize the following:

$$\max_{\alpha, \beta, s} \alpha + \beta F(e, s; t) - h(s)$$

subject to

$$\int_{t \in T_F} u[-\alpha + (1-\beta)F(e,s;t)]\, d\Phi(t) - v(e) \geq \int_{t \in T_F} \bar{u}_t\, d\Phi(t) \;, \qquad IR$$

$$\beta F_2(e,s;t) = h^{'}(s) \;, \qquad MH_c$$

$$(1-\beta) \int_{t \in T_F} u^{'}(.)F_1(e,s;t)\, d\Phi(t) = v^{'}(e) \;. \qquad MH_m$$

IR, MH_c and MH_m are the individual rationality, moral hazard constraint for the company and the moral hazard constraint manager respectively. The participation constraint states that the manager must be given adequate remuneration which must at least cover his opportunity cost. For a solution to this problem with moral hazard on both sides see Bhattacharya & Lafontaine(1995). We will just point out that when there is moral hazard on part of both the company and the manager the optimal contract will have revenue sharing between the two contracting agents i.e., $\beta \in]0,1[$ which implies that the royalty rate is a strict fraction and cannot be either zero or one. Let the solution to the above problem be denoted by $(\hat{\alpha}, \hat{\beta}, \hat{e}_t, \hat{s}_t)$. Let the effort induced by the franchise contract be denoted by $\hat{e}_t$ footnote .The profit from a franchise contract is

$$\Pi^F(t) = \hat{\alpha} + \hat{\beta}F(\hat{e}_t, \hat{s}_t; t) - h(\hat{s}_t) \;.$$

The change in the profit from a company owned store due to a change in outlet type is given by

$$\frac{\partial \Pi^F(t)}{\partial t} = \hat{\beta}F_3(\hat{e}_t, \hat{s}_t; t) \geq 0 \;. \qquad \#$$

Since F_{33} is convex, $\Pi^F(t)$ is convex as well.

C: Equilibrium

The equilibrium in this model will be characterized by the company choosing a form of contract that maximizes its returns. The company is going to choose a particular mode of operation of an outlet depending on the which one provides it with greater profits. Hence we are interested in $\max\{\Pi^F(t), \Pi^O(t)\}$. If $\Pi^F(t) > \Pi^O(t)$ then the company will open a franchised outlet and vice-versa. The next proposition helps us in characterizing a part of the equilibrium.

Proposition 2: *There exists a* $\underline{t}$ *such that for all* $t < \underline{t}$ *the company will open a franchised outlet.*

Proof: See the appendix. [End Proof]

The proposition above proves that there will always exist some outlet types where the company will find it profitable to open a franchised store. To show that a company will find it profitable to open a company owned store at some outlet types requires careful analysis. A franchised outlet is inefficient because both the company and the manager provide sub-optimal level of inputs as none of them gets the entire revenue. A company owned store solves that inefficiency through the provision of efficiency wage to the manager and making the company the residual claimant in the revenue. However as the company provides efficiency wages to the manager to implement the optimal effort level it reveals the outlet type and hence the outside utility that the manager can receive. If the cost of revealing this information to the company is too high then the company might never want to open a company owned store. The following proposition gives us a condition that will ensure the existence of company owned stores at some outlet types.

Proposition 3:*If* $\frac{K^{'}(t)}{F_3(e_t^*, s_t^*, t)} < (1-\hat{\beta})$ *for all* t *then there exists a* t^* *such that for all* $t < t^*$ *the* *company will open a franchised outlet and for all $t > t^*$ the company will open a company owned outlet.*

Proof: See the appendix. [End Proof]

$(1 - \widehat{\beta})$ is the share of the manager in the revenue of an franchised outlet. Proposition 3 tells us that if the increase in outside wage is sufficiently small in comparison to the increase in revenue of an outlet due to improvement in outlet type, there will be a threshold location type above which the company would open a company owned store.

Several different cases can arise. First, if the reservation wage function $K(t)$ is linear in t, or concave in t, which in turn makes $\Pi^O(t)$ convex, then we get a unique intersection between $\Pi^O(t)$ and $\Pi^F(t)$. The latter has been shown to be convex always. In this case we get the result that for all locations where $t < t^*$, a franchised store is opened while for all $t > t^*$, a company-owned store is opened. Figure 2a depicts this situation.

[Figure 2a about here]

On the other hand suppose $\Pi^O(t)$ is concave. This potentially allows for multiple thresholds. This situation is shown in Figure 2b. In this case the company will open franchised outlets if outlet type is lower than $\underline{t}$ or if outlet type is greater than $\bar{t}$. In the intermediate outlet types, where $\underline{t} < t < \bar{t}$, the company is going to open a company owned outlet.

[Figure 2b about here]

Finally suppose that the sufficient condition for Proposition 3 is not satisfied i.e. $\frac{K'(t)}{F_3(e_t^*, s_t^*, t)} < (1 - \widehat{\beta})$. Since $0 < \widehat{\beta} < 1$, this implies that $\frac{K'(t)}{F_3(e_t^*, s_t^*, t)} < 1$ or $K'(t) < F_3(e, s; t)$. If it is the case that $K'(t) > F_3(e, s; t)$ then there may not be any outlet type where the company would open a company owned store. This would imply that with an improvement in location type, the outside option to the manager grows faster than the increase in revenue. This was the crux of Assumption 5 above. As long as $K'(t) < F_3(e, s; t)$ there exists a rationale for opening company-owned stores. If not then $\Pi^F(t)$ dominates $\Pi^O(t)$ for all $t \in [0, T]$ and the company will prefer to open a franchised outlets at all locations. It is possible that the profit from a franchised outlet is always higher for all location types so that there are no locations in which the company will open a company owned outlet as in Figure 2c.

[Figure 2c about here]

In our next proposition we try to understand the effect of monitoring cost and monitoring technology of the company on its decision to open a franchised or company owned outlets.

Proposition 4: *The set of outlet types in which the company opens a company owned store is increasing in $p(e)$ and decreasing in M.*

Proof: See the appendix. [End Proof]

Improvement in monitoring technology available to the company is manifested through shift in the function $p(e)$ to some function like $\widehat{p}(e)$ where $\widehat{p}(e) \geq p(e)$. It reduces the efficiency wage that the company has to provide a manager to implement the effort level it desires. The result is an increase in the profits from a company owned outlet. A decrease in monitoring cost M also has a similar effect.

This finding is borne out by prior research. Brickley and Dark (1987) found that outlets physically close to monitoring headquarters (which consequently had lower monitoring costs) were more likely to be company-owned than outlets further away from these headquarters.

Proposition 5: *An increase in the set of outlet types leads to an increase in the set of outlet types where the company opens a company owned outlet. In some cases it might reduce the set of outlet types in which the company opens franchised outlets.*

Proof: See the appendix. [End Proof]

An increase in the set of outlet types can be thought of as an increase in T to say $T+\varepsilon$. Note that increase in the set of outlet types i.e., an increase in T does not change the profit function of the company owned outlets at any t. Now let us try to understand the effect of an increase in T on the profits from a franchised outlet. The profit function from a franchised outlet depends on T through the expected outside utility that the company has to give to a manager. If the sufficient condition for Proposition 3 is satisfied then the company is going to open company owned stores at outlet types between T and $T+\varepsilon$. Hence there will be no change in the outside utility that company has to provide to a manager through a franchised contract. This is denoted in Figure 3a. The other extreme case is when there were no company owned stores to start with. If initially there were no company owned outlets then an increase in T to $T+\varepsilon$ causes the $\Pi^F(t)$ to decline and that causes the set of company owned outlets to increase if the change is sufficiently high(see Figure 3c). A similar effect is also taking place in Figure 3b but to a lesser magnitude.

Conclusion

In this paper we have developed a simple model explaining the co-existence of company owned stores and franchised outlets on the basis of differences in location quality. We show that franchisers will choose to open company owned stores in more profitable locations while leaving franchisees to open stores in less lucrative sites. The validity of our theoretical results are borne out by empirical evidence showing that company owned stores have higher sales volume than franchised outlets. We also show how the chances of opening a company owned store decreases with increasing monitoring costs - yet another empirical regularity reported in the literature.

Before ending we would like to point out that Minkler (1992, pp. 242, Footnote 6) comments in Sacramento, California there are 34 Taco Bell restaurant outlets within a 30 mile radius. Seven of these are company owned. Both forms of tenure are dispersed throughout the area and the closest outlet to each company-owned store is franchised. During 1985-6 period, ten new restaurants were opened. Seven of these were franchised." This is not necessarily a criticism of our model but rather a validation. Two locations close to one another may very well be different. To take an example a location at the corner of 42nd Street and 8th Avenue in New York may be considered a "bad" location while a few blocks down Times Square would be very definitely be a "good" location. So within a thirty-mile radius we will have both good and bad locations. We believe this paper fills an important void by providing a comprehensive theoretical model explaining the co-existence of both company owned and franchised stores.

bl Bhattacharya, S. & Lafontaine, F. (1995). Double sided moral hazard and the nature of share contracts. *Rand Journal of Economics*, 26: 761-81.

bd Brickley, J.A. & Dark, F.A. (1987). The choice of organizational form: the case of franchising. *Journal of Financial Economics*, 18: 401-20.

bdw Brickley, J.A., Dark, F.H. and Weisbach, M.S.(1991) "An Agency Perspective on Franchising" *Financial Management*, vol. 20, pp. 27-35.

br Brown, W.O. (1998). Transactions Costs, corporate hierarchies and the theory of franchising. *Journal of Economic Behavior and Organization*, 36: 319-29.

ch Cheung, S.N.S. (1969). The theory of share tenancy, University of Chicago Press.

ek Eswaran, M. & Kotwal, A. (1985). A theory of contractual structure in agriculture. *American Economic Review*, 75: 352-67.

go Goldberg, J.D., (1983) "A Transaction Cost Analysis of Franchising with Empirical Applications to the Restaurant Industry", Ph.D. dissertation, University of Pennsylvania.

hu Hunt, S. (1973). The trend towards company operated units in franchise chains. *Journal of Retailing*, Summer, 3-12.

kl Kaufman, P. & Lafontaine, F. (1994). Costs of control: source of economic rents for

McDonald's franchises. *Journal of Law and Economics*, 37: 417-53.
la1 Lafontaine, F. (1992). Agency theory and franchising: some empirical results. *Rand Journal of Economics*, 23: 263-83.
la2 Lafontaine, F. (1995). Pricing decisions in franchised chains: A look at the restaurant and fast food industry. *NBER Working Paper* 5247, September 1995.
ls Lafontaine, F. & Shaw, K. (1995). Firm specific effects in franchise contracting: sources and implications. mimeo, University of Michigan and NBER, December.
ma Martin, R.E. (1988). Franchising and risk management. *American Economic Review*,78: 954-68.
mat Mathewson, G.F. & Winter, R.A. (1985). The economics of franchise contracting. *Journal of Law and Economics*. 28: 506-26.
mi Minkler, A. (1992). Why firms franchise: a search cost theory. *Journal of Institutional and Theoretical Economics*, 148: 240-59.
no Norton, S.W. (1988). An empirical look at franchising as an organization form. *Journal of Business*, 61:197-217.
ru Rubin, H. (1978). The theory of the firm and the structure of franchise contracts. *Journal of Law and Economics*, 21: 223-233.
sc Schotter, A. (1999), Microeconomics: A Modern Approach, Chapter 8, 2nd edition. Addison Wesley.
se Sen, K.C. (1993). The use of initial fees and royalties in business-format franchising. *Managerial and Decision Economics*, 24: 58-77.
sm Smith, R. (1982). Franchise regulation: An economic analysis of state restrictions on automobile distribution. *Journal of Law and Economics*, 25: 125-57.

Appendix

Proof of Proposition 1:
Firstly note that for the efficiency wage to induce a manager to provide more effort it must be greater than the outside wage hence $u(W^*) > \bar{u}_t$. If the manager maximizes his expected payoff in given the efficiency wage then he will choose the effort level to solve

$$-p'(e)[u(W^*) - \bar{u}_t] - v'(e) = 0 .$$

Let $\tilde{e}$ be the solution to the above equality. It is easy to check that $\tilde{e}$ also satisfies the second order condition for maximum given our assumptions about the functions $p(.)$ and $v(.)$. The manager will choose to shirk only if $\tilde{e} < e^*$ which is the level of effort that the company wants to implement. Hence the company must set the efficiency wage to a level where the maximum of the expected payoff to the manager from shirking is lower than or equal to the payoff from providing the effort required by the company, i.e.,

$$p(\tilde{e})\bar{u}_t + (1 - p(\tilde{e}))u(W^*) - v(\tilde{e}) \le u(W^*) - v(e^*) .$$

or

$$u(W^*) = \bar{u}_t + \frac{v(e^*)}{p(\tilde{e})} .$$

[End Proof]

Proof of Proposition 2: Define a variable $D(t) = \Pi^F(t) - \Pi^O(t)$. The variable $D(t)$ tells us the difference in profits between a franchised and company owned outlet. Rearranging we can write

$$D(t) = \hat{\alpha} + \hat{\beta}F(\hat{e}_t, \hat{s}_t; t) - F(e_t^*, s_t^*; t) + [h(s_t^*) - h(\hat{s}_t)] + W_t^* + M \, .$$

Note that $s_t^* \geq \hat{s}_t$. Since $F(e,s;t) \to 0$ as $t \to 0$ $D(t) \to N$ as $t \to 0$ where N is some positive number. Hence there would exist some $\underline{t}$ such that $\Pi^F(t) > \Pi^O(t)$ for any $t < \underline{t}$. [End Proof]

Proof of Proposition 3: Consider the variable $D(t)$. The proof of proposition 2 already establishes the existence of some $\underline{t}$ below which the variable $D(t) > 0$. Now let us consider the partial derivative of $D(t)$. Using equations (3) and (4) we get

$$\begin{aligned} D'(t) &= \hat{\beta}F_3(\hat{e}_t, \hat{s}_t; t) - F_3(e_t^*, s_t^*; t) + K'(t) \\ &\leq -(1-\hat{\beta})F_3(e_t^*, s_t^*; t) + K'(t) \, . \end{aligned}$$

If $\frac{K'(t)}{F_3(e_t^*, s_t^*, t)} < (1-\hat{\beta})$ then $D'(t) < 0$. Since $0 < \hat{\beta} < 1$, this implies that $\frac{K'(t)}{F_3(e_t^*, s_t^*, t)} < 1$ or $K'(t) < F_3(e,s;t)$. Hence there would exist some t^* such that for all $t < t^*$, $D(t) > 0$ and for all $t > t^*$, $D(t) < 0$.If not i.e. $K'(t) > F_3(e,s;t)$ then D(t) > 0 for all t. In that case following from the proofs of Propositions 3 and 4, there will be no company-owned stores. [End Proof]

Proof of Proposition 4: Suppose the monitoring technology of the company improves such that the probability of detection of a manager while shirking is now a function $\hat{p}(e)$ where $\hat{p}(e) \geq p(e)$ for all e. Then the efficiency wage that the company will have to give the manager in a company owned outlet will be lower. Hence the profit function of the company owned outlet is going to shift upwards. Its easy to check that increase in the monitoring cost will have the opposite effect. [End Proof]

Proof of Proposition 5: Firstly we take note of the fact that increase in the set of outlet types i.e., an increase in T does not change the profit function of the company owned outlets at any t or $\frac{\partial \Pi^O(t)}{\partial T} = 0$. Now lets try to understand the effect of an increase in T on the profits from a franchised outlet. The profit function from a franchised outlet depends on T through the expected outside utility that the company has to give to a manager. If the condition for Proposition 3 is satisfied then there is no change in t^* due to change in T. Therefore the effect of an increase in T is that the company opens company owned outlets at the higher outlet types. If initially there were no company owned outlets then an increase in T to $T + \varepsilon$ causes the $\Pi^F(t)$ to decline and that causes the set of company owned outlets to increase if the change is sufficiently high(see Figure 3c). A similar effect is also taking place in Figure 3b. [End Proof]