1 A Model of a Franchise Contract

1.1 *Initial conditions*

A parent firm, or franchisor, sells his product in a set of geographically dispersed markets, or nodes. In each market there is an outlet where final production and sales are carried out by an agent, or franchisee.

Demand conditions are assumed to vary across markets and each agent is assumed to have better information about local market conditions than the franchisor. The franchisor possesses a certain amount of monopoly power in each market.

At any given outlet the agent may be a franchisee or simply an employee of the franchisor. If the latter is the case, then the outlet is referred to as a corporate store.

Denote the location, or address, of a local market by x_0 ($x_0 > 0$). The location of the franchisor will be normalized to be zero. Therefore x_0 represents the distance between the franchisor and the local market.

The franchisor produces a good at a constant cost of v per unit. The good is distributed by the agent to the local market. The agent also contributes additional input into the final good in the form of services or some other quality enhancing attributes.

Let s denote the level of service provided by the agent and let $c(s)$ be the agent's cost of s where $c'(s) > 0$ and $c''(s) > 0$.

Finally, each outlet incurs fixed cost of K.

Demand in the local market is a function of both price, p, and the level of services, s.[1] Let q denote quantity demanded at location x_0 and the demand function is given by

$$q = D(s, p) \tag{1}$$

where

$$\partial D/\partial s > 0 \quad and \quad \partial D/\partial p < 0$$

The franchise contract specifies a payment schedule plus a level of s. The schedule for which the agent pays the franchisor royalties takes the form of a two-part tariff with a fixed and variable component:

[1] Local demand is also a function of the strength of the national brand name. For our purposes, this is assumed exogeonous and is therefore supressed in the model.

$$f + \alpha(p - v)D(s, p) \qquad (where\ 0 \leq \alpha \leq 1) \tag{2}$$

f is the lump-sum franchise fee and α is the share of sales revenue that accrue to the franchisor.

1.2 *The decision to shirk*

Given the franchise contract, the agent may have an incentive to shirk on the level of services he is to supply. The decision to shirk will be a function of

(i) the profits from shirking;

(ii) the probability of detection by the franchisor; and,

(iii) the penalty, or sanction from shirking.

The probability of detection will, in turn, depend on the level of monitoring activity that the franchisor engages in and the degree by which the agent lowers the level of services below the contractually specified level.

Define ϕ as the frequency of monitoring carried out by the franchisor, which is normalized to be between 0 and 1.

Furthermore, define Δs as the difference between the contractual level of s (denoted s^*) and the actual level of s supplied by the agent (i.e. $\Delta s = s^* - s$). Therefore the lower the actual level of services relative to the level specified in the contract, the greater will be Δs

($\Delta s = 0$ implies no shirking).

The probability of the agent being detected shirking will be a function of both the frequency of monitoring and the degree of shirking by the agent[2]. Let δ denote the probability of detection, which can be expressed as follows:

$$\delta = \delta(\Delta s; \phi) \tag{3}$$

where

$$\partial\delta/\partial\phi > 0 \quad and \quad \partial\delta/\partial\Delta s > 0$$

[2]It is also possible that $s > s^*$, in which case the franchisee is supplying a level of service greater than the level specified in the contract. This may lead to *intra franchise* competition which lowers the franchisor's rents. Most franchise contracts will also attempt to minimize this form of behavior. For a more formal treatment, see Winter, R. A. "Vertical Control and Price versus Non-price Competition", *Working Paper* (1990).

In most franchise contracts the penalty for shirking is termination of the franchise agreement[3]. Therefore the expected profit from supplying a low level of services can be expressed as

$$\pi_L = (1 - \delta(\Delta s; \phi))\pi(p, \Delta s) \tag{4}$$

where $\pi(p, \Delta s)$ is the agent's profits as he deviates from the contracted level of s.

Differentiating (4) with respect to Δs solves for Δs (and therefore s) that maximizes the agent's expected profits from shirking, or

$$(1 - \delta(\Delta s; \phi))\frac{\partial \pi}{\partial \Delta s} - \pi(p, \Delta s)\frac{\partial \delta}{\partial \Delta s} = 0 \tag{5}$$

For any given level of ϕ the profit function of the agent (4) is at first increasing, then decreasing in Δs. Intuitively this results from the fact that as the level of service falls, the expected profits for the agent rises from the cost savings. However, as the level of services falls, the probability of detection rises, thus lowering expected profits. ϕ is a shift parameter in the expected profit function. Expected profits as a function of shirking on services (Δs) are illustrated in figure one.

Therefore, if $\pi_H = \pi(p, 0)$ is the profits of the agent when no shirking occurs, then the agent will choose to shirk if, at the s that maximizes (4),

$$\pi(p, 0) < (1 - \delta(\Delta s; \phi))\pi(p, \Delta s) \tag{6}$$

Equation 10 represents the incentive compatibility constraint faced by the franchisor.

If the franchisor decides to monitor the agent he will incur monitoring costs which are denoted as M. The costs of monitoring will be an increasing function of both the frequency of monitoring and the remoteness of the agent. Therefore the costs of verifying performance are

$$M = M(\phi, x_0) \tag{7}$$

[3]See the Appendix for a summary of an empirical study of franchise contracts.

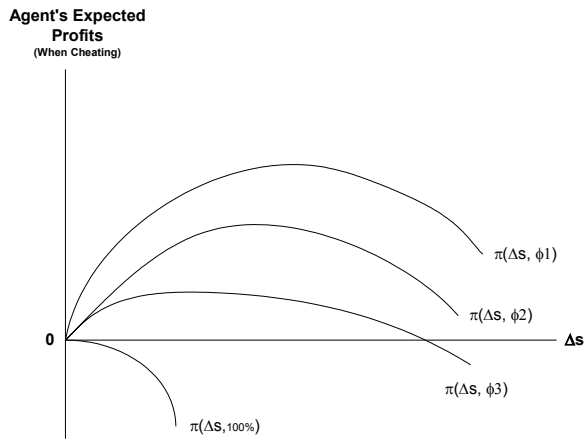

Figure 1: The agent's expected profit as a function of the level of shirking, given some known frequency of monitoring (ϕ). Changes in the frequency of monitoring will shift the agent's expected profit function.

Figure 1:

where

$$\partial M/\partial \phi > 0 \quad and \quad \partial M/\partial x_0 > 0.$$

The Franchisor's objective is to maximize

$$\Pi(s,p) = f + \alpha(p-v)D(s,p) - M(\phi, x) \tag{8}$$

by choice of p, s, α, ϕ, and f subject to

$$\pi(p,s) = (1-\alpha)(p-v)D(s,p) - c(s) - f - K \geq 0 \tag{9}$$

and

$$\pi(p,0) \geq (1-\delta(\Delta s;\phi))\pi(p,\Delta s) \tag{10}$$

Equation 9 is a non-negativity constraint on the agents profits[4] and equation 10 is the incentive compatibility constraint. Let λ_1 and λ_2 denote the

[4]For simplicity, it is assumed that the agent's opportunity cost is zero.

lagrange multipliers for equations (9) and (10) respectively. Applying Kuhn Tucker conditions and noting that (9) is non-binding in the presence of (10), we get the following results:

$$p(1 - 1/\epsilon_H) = v + k(1 - \delta)(p(1 - 1/\epsilon_L) - v) \tag{11}$$

$$\alpha(p - v)\partial D/\partial s = kc'(s) \tag{12}$$

$$\partial M/\partial \phi = \lambda_2((1 - \delta)\partial \pi_L/\partial \phi - \pi_L \partial \delta/\partial \phi) > 0 \tag{13}$$

$$where \quad k = \frac{1}{\alpha/\lambda_2 + (1 - \alpha)} > 0$$

In equation (11), ϵ_H is the price elasticity of demand for a given s^* and ϵ_L is the price elasticity of demand when the agent chooses to shirk. Equation (11) implies that the price will be higher when the incentive to shirk is absent. Equation (12) determines s^*. If $\alpha < \lambda_2$ then the level of services will be set below the first best level. Equation (13) sets the level of monitoring and implicitly determines the rent stream accruing to the agent.

Since $\partial M/\partial x_0 > 0$, we can see from equation (13) that as the distance between the franchisor and the outlet increases, the level of monitoring will decrease and the rent stream to the agent will rise. This result is illustrated in figure two.

1.3 *Expansion of the Market*

Now at a certain point in the future the population allowed to grow. The increase in demand increases sales for the outlet. However, due to diminishing returns at the local level, the franchise is not able to fully supply the extra output at the given level of s. This will lead to an increase in the incentive to shirk. Therefore the franchisor will have to either increase the level of monitoring or allow the agent's rent stream to increase. The rent stream is implicitly increased whenever the fixed component of the franchise fee is held constant in the presence of growing demand.

The increase in demand may create an incentive for the franchisor to install a second outlet in close proximity to the first franchise. At this point

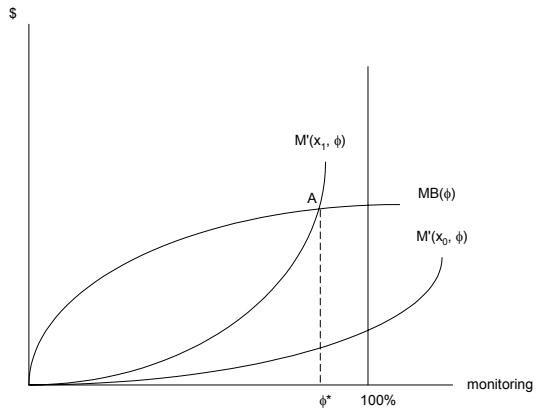

Figure 2: The marginal benefit of monitoring (MB(ϕ)) is compared to the location specific marginal cost of monitoring. If the distance is small (x_0), it may pay to engage in 100% monitoring. If the distance is large enough (x_1), then there will be an interior solution of imperfect monitoring (point A).

Figure 2:

the franchisor must decide whether it is more profitable to convert the franchises back to corporate owned and operated outlets or let them remain as franchise outlets. There are two factors that the franchisor must consider in making the decision to convert a franchise back to a corporate store. The first is the costs of monitoring two outlets which exist in close proximity to each other. The second is how the two outlets will interact while operating under a franchise arrangement.

1.4 *The monitoring problem with Two Outlets*

As before, the franchisor must travel to the outlet in order to engage in monitoring. Therefore the cost of monitoring the first outlet is $M(\phi, x_0)$.

Now suppose a second outlet is located in the same market. Since the transportation costs must be incurred to monitor a single outlet at location x_0, they become sunk costs, thus the cost of monitoring the second store is $M(\phi, 0)$ (where $M(\phi, 0) < M(\phi, x_0)$).

The marginal cost of monitoring functions for each of the stores is illus-

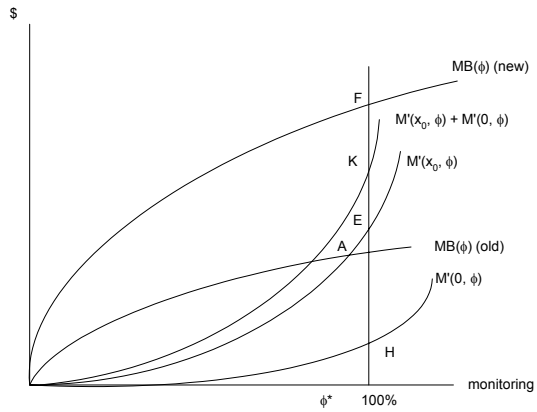

Figure 3: The marginal benefit of monitoring (MB(ϕ)) Shifts up due to growth in the market. If a second store is added to the local market, then its marginal cost of monitoring is lower than the first store since the cost of x is incurred monitoring the first outlet. Thus the marginal cost of monitoring both stores is less than twice the cost of monitoring the first.

Figure 3:

trated in figure three.

In figure three $M'(\phi, x_0)$ intersects the original marginal benefit of monitoring schedule, MB_1, at point A. The increase in demand shifts the marginal benefit schedule up to MB_2. The marginal cost of 100% monitoring of the first store is given by point E. If a second store is also located at distance x_0, then the cost of monitoring the second store is given by point H. The marginal benefit of 100% monitoring is given by point F. If the distance F to E is greater than the height to point H, then it will be worthwhile for the franchisor to convert the two stores to corporate outlets and engage in full monitoring. Regardless of the choice of contractual arrangement that the franchisor finally settles on, it is clear from figure 4 that the marginal cost of monitoring a second store is less than that of a single store in the same geographical area.

In addition to the non-convexity in monitoring costs described above, there exists a further potential reduction in monitoring when there is a second

outlet. The franchisor can use information from one outlet to infer local demand conditions of the second outlet. For example if one store reports high sales in the same market that the other outlet reports low sales, the franchisor may be able to form a better prior about the likelihood that the second store is shirking on quality rather than suffering from a random drop in demand.

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