Appendix

Proof of Lemma 1: Consider $p < b'(0)$, otherwise the vendor will sell nothing. If she does not subscribe to the service contract, the buyer would get net benefit, $b(0) + I$. If she subscribes, the buyer would choose *q* and *m* to maximize

$$b(q) + m, \tag{A1}$$

subject to

$$T + pq + m \le I. \tag{A2}$$

Solving the problem yields consumption bundle (q^*, m^*) prescribed in (1) and (2). The buyer ends up with net benefit, $b(q^*) + m^*$. Obviously, if $b(q^*) + m^* \ge b(0) + I$, i.e.,

$$b(q^*) - b(0) \ge T + pq^*, \tag{A3}$$

the buyer prefers to subscribe, which means (q^*, m^*) is her optimal consumption bundle. Otherwise the buyer rejects the contract. *Q.E.D*

Proof of Proposition 2: Set up the vendor's maximization as a Lagrangian,

$$L(T, p, \lambda) = T + \int_{\underline{s}}^{\bar{s}} [p - c] q(T, p, s) dG(s) + \lambda \int_{\underline{s}}^{\bar{s}} [u(x(T, p, s)) - u(b(0, s) + I)] dG(s) \tag{A4}$$

where λ is the Lagrange multiplier ("shadow price") of the buyer's individual rationality constraint (14). Now $\lambda > 0$ since any relaxation of the buyer's individual rationality constraint would allow the vendor to raise the entry fee and increase profit. Since there is no direct constraint on the sign of *T* or *p*, the problem has an interior solution.

The first order condition with respect to *T*,

$$\frac{\partial L(T,p,\lambda)}{\partial T} = 1 + \lambda\int_{\underline{s}}^{\bar{s}} u'(x(T,p,s))x_T(T,p,s)dG(s) \\ = \int_{\underline{s}}^{\bar{s}} [1-\lambda u'(x(T,p,s))]dG(s) = 0 \tag{A5}$$

using (11). Further, the first order condition with respect to p,

$$\frac{\partial L(T,p,\lambda)}{\partial p} = \int_{\underline{s}}^{\bar{s}} \big[q(T,p,s) + [p-c]q_p(T,p,s)\big]dG(s) \\ + \lambda\int_{\underline{s}}^{\bar{s}} u'(x(T,p,s))x_p(T,p,s)dG(s) = 0. \tag{A6}$$

From (9) and (12), we have

$$x_p(T,p,s) = b_q(q(T,p,s),s)q_p(T,p,s) - q(T,p,s) + pq_p(T,p,s) = -q(T,p,s)\,. \tag{A7}$$

Hence (A6) simplifies to

$$\frac{\partial L(T,p,\lambda)}{\partial p} = \int_{\underline{s}}^{\bar{s}} \big[q(T,p,s) + [p-c]q_p(T,p,s)\big]dG(s) - \lambda\int_{\underline{s}}^{\bar{s}} u'(x(T,p,s))q(T,p,s)dG(s) \\ = \int_{\underline{s}}^{\bar{s}} q(T,p,s)[1-\lambda u'(x(T,p,s)]dG(s) + [p-c]\int_{\underline{s}}^{\bar{s}} q_p(T,p,s)dG(s) = 0. \tag{A8}$$

Note that $1-\lambda u'(x(T,p,s))$ is strictly increasing in s as

$$\lambda\frac{\partial}{\partial s}u'(x(T,p,s)) = \lambda u''(x(T,p,s))\cdot b_s(q(T,p,s),s) < 0, \tag{A9}$$

since, by assumption, $u''(.) < 0$ and $b_s(q,s) > 0$. Hence (A5) implies that there exists $s^0 \in (\underline{s},\bar{s})$ such that

$$1-\lambda u'(x(T,p,s)) \quad \begin{cases} < 0 & \text{if } s < s^0 \\ = 0 & \text{if } s = s^0 \\ > 0 & \text{if } s > s^0 \end{cases} \tag{A10}$$

Meanwhile, differentiating (9) partially with respect to s, and re-arranging, we have

$$q_s(T,p,s) = -\frac{b_{qs}(q(T,p,s),s)}{b_{qq}(q(T,p,s),s)} > 0\,, \tag{A11}$$

since, by assumption, $b_{qq}(q,s) < 0$ and $b_{qs}(q,s) > 0$. Hence given (T,p), the quantity demanded increases with s.

Referring to the first term on the right-hand side of (A8), we have

$$
\begin{aligned}
&\int_{\underline{s}}^{\bar{s}} q(T,p,s)[1-\lambda u'(x(T,p,s))]dG(s) \\
&\quad = \int_{\underline{s}}^{s^0} q(T,p,s)[1-\lambda u'(x(T,p,s))]dG(s) + \int_{s^0}^{\bar{s}} q(T,p,s)[1-\lambda u'(x(T,p,s))]dG(s) \\
&\quad > \int_{\underline{s}}^{s^0} q(T,p,s^0)[1-\lambda u'(x(T,p,s))]dG(s) + \int_{s^0}^{\bar{s}} q(T,p,s^0)[1-\lambda u'(x(T,p,s))]dG(s) \\
&\quad = \int_{\underline{s}}^{\bar{s}} q(T,p,s^0)[1-\lambda u'(x(T,p,s))]dG(s) = 0,
\end{aligned}
\tag{A12}
$$

where the inequality uses (A10) and (A11), and the final equality uses (A5). By (A12) and (A8), we have

$$[p-c]\int_{\underline{s}}^{\bar{s}} q_p(T,p,s)dG(s) < 0 \,. \tag{A13}$$

Differentiating (9) partially with respect to q, and re-arranging,

$$q_p(T,p,s) = \frac{1}{b_{qq}(q(T,p,s),s)} < 0 \,, \tag{A14}$$

since, by assumption, $b_{qq}(q,s) < 0$. Applying (A14) to (A13), it follows that $p^* > c$. *Q.E.D.*

Proof of Lemma 2. Differentiating (19) with respect to s,

$$x_s(T,p,s) = b_q(q(T,p,s),s)q_s(T,p,s) + b_s(q(T,p,s),s) - D'(s) - pq_s(T,p,s) \,. \tag{A15}$$

Since $b_q(q(T,p,s),s) = p$, we immediately have

$$x_s(T,p,s) = b_s(q(T,p,s),s) - D'(s) < 0 \,. \tag{A16}$$

Q.E.D.

Proof of Proposition 3: Set up the vendor's maximization as a Lagrangian,

$$
\begin{aligned}
L(T,p,\lambda) = T &+ \int_{\underline{s}}^{\bar{s}} [p-c]q(T,p,s)dG(s) \\
&+ \lambda \int_{\underline{s}}^{\bar{s}} [u(x(T,p,s)) - u(b(0,s)+D(s)-I)]dG(s),
\end{aligned}
\tag{A17}
$$

where λ is the Lagrange multiplier of the buyer's individual rationality constraint (21). Now

$\lambda > 0$ since any relaxation of the buyer's individual rationality constraint would allow the vendor to raise the entry fee and increase profit. Since there is no direct constraint on the sign of *T* or *p*, the problem has an interior solution.

The first order condition with respect to *T* is

$$\begin{aligned}\frac{\partial L(T,p,\lambda)}{\partial T} &= 1+\lambda\int_{\underline{s}}^{\bar{s}} u'(x(T,p,s))x_T(T,p,s)dG(s) \\ &= \int_{\underline{s}}^{\bar{s}} [1-\lambda u'(x(T,p,s))]dG(s) = 0,\end{aligned} \tag{A18}$$

where we make use of (11). Further, the first order condition with respect to *p* is

$$\begin{aligned}&\frac{\partial L(T,p,\lambda)}{\partial p} \\ &= \int_{\underline{s}}^{\bar{s}} \left[q(T,p,s)+[p-c]q_p(T,p,s)\right]dG(s)+\lambda\int_{\underline{s}}^{\bar{s}} u'(x(T,p,s))x_p(T,p,s)dG(s) = 0.\end{aligned} \tag{A19}$$

From (A7), we have $x_p(T,p,s) = -q(T,p,s)$. Hence (A19) becomes

$$\begin{aligned}\frac{\partial L(T,p,\lambda)}{\partial p} &= \int_{\underline{s}}^{\bar{s}} \left[q(T,p,s)+[p-c]q_p(T,p,s)\right]dG(s)-\lambda\int_{\underline{s}}^{\bar{s}} u'(x(T,p,s))q(T,p,s)dG(s) \\ &= \int_{\underline{s}}^{\bar{s}} q(T,p,s)[1-\lambda u'(x(T,p,s)]dG(s)+[p-c]\int_{\underline{s}}^{\bar{s}} q_p(T,p,s)dG(s) = 0\end{aligned}.$$

(A20)

Note that $1-\lambda u'(x(T,p,s))$ is strictly decreasing with respect to *s* because

$$\lambda\frac{\partial}{\partial s}u'(x(T,p,s)) = \lambda u''(x(T,p,s))\cdot x_s(T,p,s) > 0, \tag{A21}$$

since $u''(.) < 0$ by assumption, and $x_s(T,p,s) < 0$ by Lemma 2. Hence (A18) implies that there exists $s^0 \in (\underline{s},\bar{s})$ such that

$$1-\lambda u'(x(T,p,s)) \quad \begin{cases} > 0 & \text{if } s < s^0 \\ = 0 & \text{if } s = s^0 \\ < 0 & \text{if } s > s^0 \end{cases}. \tag{A22}$$

Meanwhile, differentiating (17) partially with respect to *s*, and re-arranging, we have

$$q_s(T,p,s) = -\frac{b_{qs}(q(T,p,s),s)}{b_{qq}(q(T,p,s),s)} > 0, \tag{A23}$$

since, by assumption, $b_{qq}(q,s) < 0$ and $b_{qs}(q,s) > 0$. Hence given (T,p), the quantity demanded increases with *s*.

Referring to the first term on the right-hand side of (A20), we have

$$
\begin{aligned}
&\int_{\underline{s}}^{\bar{s}} q(T,p,s)[1-\lambda u'(x(T,p,s))]dG(s) \\
&\quad = \int_{\underline{s}}^{s^0} q(T,p,s)[1-\lambda u'(x(T,p,s))]dG(s) + \int_{s^0}^{\bar{s}} q(T,p,s)[1-\lambda u'(x(T,p,s))]dG(s) \\
&\quad < \int_{\underline{s}}^{s^0} q(T,p,s^0)[1-\lambda u'(x(T,p,s))]dG(s) + \int_{s^0}^{\bar{s}} q(T,p,s^0)[1-\lambda u'(x(T,p,s))]dG(s) \\
&\quad = \int_{\underline{s}}^{\bar{s}} q(T,p,s^0)[1-\lambda u'(x(T,p,s))]dG(s) = 0,
\end{aligned} \quad . \text{(A24)}
$$

where the inequality uses (A22) and (A23), and the final equality uses (A18). By (A24) and (A20), we have

$$[p-c]\int_{\underline{s}}^{\bar{s}} q_p(T,p,s)dG(s) > 0\,. \qquad \text{(A25)}$$

Differentiating (17) partially with respect to *q*, and re-arranging,

$$q_p(T,p,s) = \frac{1}{b_{qq}(q(T,p,s),s)} < 0\,, \qquad \text{(A26)}$$

since, by assumption, $b_{qq}(q,s) < 0$. Applying (A26) to (A25), it follows that $p^* < c$.

Q.E.D.

Proof of Proposition 4: Consider the sales of a felicitous good. Set up the vendor's problem as a Lagrangian,

$$L(T,p,\mu) = \int_{\underline{s}}^{\bar{s}} u(b(q(T,p,s),s) + m(T,p,s))dG(s) + \mu[T + \int_{\underline{s}}^{\bar{s}} [p-c]q(T,p,s)dG(s)]\,, \qquad \text{(A27)}$$

where μ is the Lagrange multiplier of constraint (25). Note that $\mu > 0$ because buyers can achieve strictly higher utility when the constraint is slightly relaxed.

The first order condition with respect to *T* is

$$\frac{\partial L(T,p,\mu)}{\partial T} = \int_{\underline{s}}^{\bar{s}} u'(b(q(T,p,s),s) + m(T,p,s))m_T(T,p,s)dG(s) + \mu$$
$$= \mu - \int_{\underline{s}}^{\bar{s}} u'(b(q(T,p,s),s) + m(T,p,s))dG(s) = 0, \qquad \text{(A28)}$$

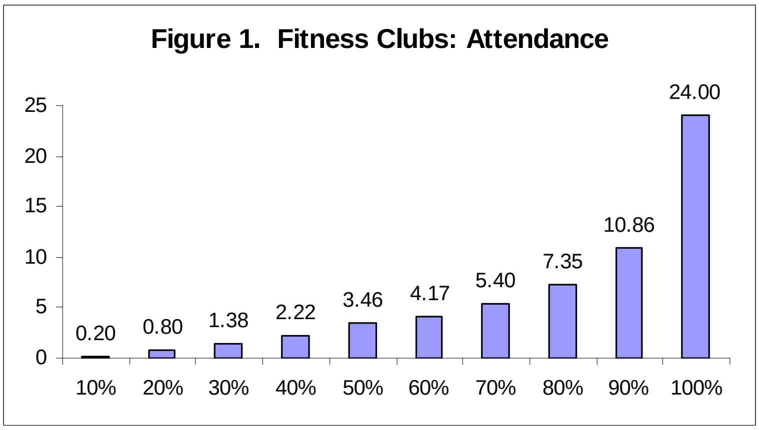
where we make use of (11), and, from (10), $m_T(T,p,s) = -1$. Further, the first order condition with respect to p is

$$\frac{\partial L(T,p,\lambda)}{\partial p} = \int_{\underline{s}}^{\bar{s}} u'(b(q(T,p,s),s) + m(T,p,s))(-q(T,p,s))dG(s)$$
$$+ \mu\int_{\underline{s}}^{\bar{s}} q(T,p,s) + (p-c)q_p(T,p,s)dG(s) = 0, \qquad \text{(A29)}$$

where we make use of (9), and, from (10), $m_p(T,p,s) = -pq_p(T,p,s) - q(T,p,s)$.

Now (A28) and (A29) are identical to (A5) and (A6) with the substitution $\mu = \frac{1}{\lambda}$. Since we established Proposition 2 using only (A5) and (A6), the same analysis applies here to imply that $p > c$.

For brevity, we omit the proof for distress goods as it follows similarly from Proposition 3. *Q.E.D.*



Note: Each column represents average attendance, in visits per month, for the corresponding decile. Total number of members: 145.

Table 1. New York restaurants: Summary statistics

	Unit	No. of obs	Mean	Min	Max	Std dev
Appetizer price	$	213	12.17	5.31	33.60	3.85
Dessert price	$	113	8.63	3.65	15.70	2.45
Soup price	$	125	8.61	3.50	19.00	2.68
Main course price	$	225	25.56	8.48	58.00	7.61
Romantic	n.a.		37%			
Singles scene	n.a.		27%			
Business dining	n.a.		42%			
Zagat: cost		298	55.86	20	146	20.21
Zagat: decor		299	20.12	8	28	3.72
Zagat: food		299	21.77	14	28	3.00
Zagat: service		299	20.3	11	28	2.97
Neighborhood: Manhattan			90.2%			
Neighborhood: Brooklyn			6.5%			
Neighborhood: Others			3.3%			
Dinner	n.a.		0.96			

Table 2. New York restaurants: Correlations (pair-wise)

	Appetizer	Dessert	Soup	Main	Business	Romantic	Single	Zagat: Cost	Zagat: Décor	Zagat: Food	Zagat: Service	Manhattan	Brooklyn	Other nbhd	Dinner
Appetizer	1.00	0.82	0.72	0.81	0.36	0.02	-0.31	0.70	0.60	0.44	0.58	0.16	-0.15	-0.07	-0.09
Dessert	0.82	1.00	0.62	0.77	0.19	0.08	-0.28	0.69	0.69	0.48	0.59	0.03	-0.05	0.06	-0.04
Soup	0.72	0.62	1.00	0.57	-0.02	0.16	-0.14	0.56	0.55	0.33	0.47	0.02	0.02	-0.07	-0.18
Main	0.81	0.77	0.57	1.00	0.46	-0.09	-0.31	0.70	0.50	0.48	0.57	0.15	-0.12	-0.08	0.04
Business	0.36	0.19	-0.02	0.46	1.00	-0.54	-0.43	0.37	0.00	0.29	0.29	0.15	-0.09	-0.15	-0.01
Romantic	0.02	0.08	0.16	-0.09	-0.54	1.00	-0.41	0.05	0.27	0.12	0.25	-0.23	0.18	0.15	-0.07
Single	-0.31	-0.28	-0.14	-0.31	-0.43	-0.41	1.00	-0.36	-0.21	-0.42	-0.56	0.10	-0.10	-0.02	0.08
Zagat: Cost	0.70	0.69	0.56	0.70	0.37	0.05	-0.36	1.00	0.57	0.62	0.68	0.13	-0.09	-0.08	-0.18
Zagat: Décor	0.60	0.69	0.55	0.50	0.00	0.27	-0.21	0.57	1.00	0.36	0.58	0.02	-0.07	0.08	-0.10
Zagat: Food	0.44	0.48	0.33	0.48	0.29	0.12	-0.42	0.62	0.36	1.00	0.80	-0.12	0.17	-0.03	-0.16
Zagat: Service	0.58	0.59	0.47	0.57	0.29	0.25	-0.56	0.68	0.58	0.80	1.00	-0.04	0.06	-0.02	-0.20
Manhattan	0.16	0.03	0.02	0.15	0.15	-0.23	0.10	0.13	0.02	-0.12	-0.04	1.00	-0.82	-0.54	0.06
Brooklyn	-0.15	-0.05	0.02	-0.12	-0.09	0.18	-0.10	-0.09	-0.07	0.17	0.06	-0.82	1.00	-0.05	-0.02
Other nbhd	-0.07	0.06	-0.07	-0.08	-0.15	0.15	-0.02	-0.08	0.08	-0.03	-0.02	-0.54	-0.05	1.00	-0.07
Dinner	-0.09	-0.04	-0.18	0.04	-0.01	-0.07	0.08	-0.18	-0.10	-0.16	-0.20	0.06	-0.02	-0.07	1.00

Table 3. New York restaurants: Pricing relative to main course

Panel A

	Price of Appetizer/Main	Price of Soup/Main	Price of Dessert/Main
Romantic	0.49 (0.078)	0.39 (0.095)	0.36 (0.084)
Singles scene	0.48 (0.098)	0.37 (0.095)	0.36 (0.078)
Business	0.45 (0.081)	0.31 (0.092)	0.32 (0.059)

Std errors in parentheses.

Panel B

	(i) Price of Appetizer/ Main	(ii) Price of Appetizer/ Main	(iii) Price of Appetizer/ Main	(iv) Price of Soup/Main	(v) Price of Soup/Main	(vi) Price of Soup/Main	(vii) Price of Dessert/ Main	(viii) Price of Dessert/ Main	(ix) Price of Dessert/ Main
Constant	0.499*** (0.029)	0.488*** (0.0698)	0.499*** (0.029)	0.411*** (0.0409)	0.359*** (0.101)	0.439*** (0.0554)	0.340*** (0.0350)	0.311*** (0.0785)	0.353*** (0.0327)
Romantic	0.0296** (0.0136)	0.0220 (0.0139)	0.0330** (0.0141)	0.0631*** (0.0192)	0.0465** (0.0208)	0.0639*** (0.0200)	0.0465*** (0.0161)	0.0295* (0.0172)	0.0457*** (0.0167)
Singles scene	0.0312** (0.0138)	0.0267 (0.0183)	0.0341** (0.0143)	0.0506** (0.0199)	0.0296 (0.0236)	0.0524** (0.0207)	0.0379** (0.0174)	0.0235 (0.0194)	0.0370** (0.0180)
Dinner	-0.0475* (0.0290)	-0.040 (0.030)	-0.0487* (0.0294)	-0.0987** (0.0395)	-0.126*** (0.0431)	-0.0940** (0.0403)	-0.0277 (0.0349)	-0.0653* (0.0366)	-0.0277 (0.0349)
Zagat ratings	-	included	-	-	included	-	-	included	-
Neighborhood	-	-	included	-	-	included	-	-	included
No. of obs.	210	207	203	125	123	121	111	109	107
Adjusted R^2	0.031	0.034	0.029	0.122	0.141	0.112	0.0639	0.144	0.0576
F-statistic	3.260	2.034	2.197	6.757	3.854	4.039	3.502	3.601	2.621

Std errors in parentheses; ***,**,* denote significance at 1%, 5%, 10% levels respectively.