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Remunerating Information Providers: Commissions versus Fees in Life Insurance

Hugh Gravelle

ABSTRACT

Life insurance policies are complex financial products. Potential purchasers can be informed and advised by brokers who are remunerated either by commissions paid by the insurer or by a fee paid by the potential consumer. This article models the determination of the price of advice, the price of the product and the quality of advice under the two remunerations systems. The model predicts that the weak market position of consumers will be exploited, even when advice and the product are sold separately. Neither remuneration system will achieve even a second-best efficient allocation.

Introduction

Potential purchasers are likely to be initially ignorant about the complex characteristics of life insurance products. They can be provided with information and advice by brokers who are remunerated by commissions paid by insurers. It has been suggested in the United Kingdom (see Office of Fair Trading, 1990), the United States (see Ferling, 1991, and Otis, 1991), and Australia (see McIlwaine, 1990) that it would be better if consumers directly paid a fee for advice about financial products rather than having the information providers receive a commission from the insurer if a sale is made. The suggestions are prompted by the argument that a commission system gives greater incentives to provide biased advice to unsophisticated potential customers. However, a change to a fee-for-advice system would also affect consumers by increasing the price of advice and reducing the price of the product. This article models the determination of the price of advice, the price of the product and the quality of advice under the two remunerations systems. The model is used to compare the welfare properties of the two systems and, particularly, to test the intuitively plausible assertion that a fee-for-advice system is better than the commission system because it leads to a lower product price and better advice.

The maintained assumption of regulators and commentators is that brokers take advantage of consumers' ignorance and lack of sophistication. This article

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shows that the weak market position of consumers will be exploited under both the commission and fee-for-advice systems. Neither remuneration system will achieve even a second-best efficient allocation. It is also demonstrated that the fee system is not necessarily superior to the commission system once the number of brokers and purchases under the two regimes are taken into account.

The next section describes the basic framework of the model that is used in the following two sections to examine the equilibrium with a commission system and with a fee-for-advice system. Next, the efficiency of the two systems is compared.[1] The model is then extended to allow for heterogeneous consumers who differ in the value they place on information. The penultimate section investigates the implications of the remuneration regime for the quality of advice. The last section summarizes the argument and contains some conclusions.

Basic Framework

The model of the life insurance market is deliberately stylized with many important features of the market ignored or assumed away. The justification for the strong assumptions and simple specification is that the aim of the article is to investigate the plausible view that a fee-for-advice regime is obviously better than a commission regime. If it can be shown that the welfare comparison of the two remuneration regimes is ambiguous even in such a simple framework then there is no need for a more elaborate and less tractable model. A simple framework also has the advantage of starkly illustrating the influence of different parameters and assumptions and points the way for further investigations by indicating the significant features of the specification.

Life Insurers

Life insurers are risk neutral, competitive, and produce identical policies and break even in equilibrium. The insurers also are assumed not to engage in direct marketing to potential consumers and to sell only through brokers.[2] The constant marginal cost of the product is c, which includes administration costs but excludes any commission payments to brokers.

Consumers

There is a large number N of potential consumers who buy at most one unit of the product. The benefit to a consumer from the product depends upon personal characteristics and product characteristics. Initially, the consumer knows some of the personal characteristics (age, family circumstances, income, etc.) which determine the potential benefit. Other characteristics are uncertain, in-

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[1] For a more detailed analysis of the commission system, see Gravelle (1991, 1993).

[2] The model is complicated, without greatly affecting the conclusion, if insurers can also engage in costly direct marketing (see Gravelle, 1991, for an analysis of the commission system with direct marketing).

cluding some of the product characteristics but also some the consumer's own personal characteristics (such as accident or mortality probabilities). The consumer is assumed to be passive in that he or she does not engage in any search or attempt to acquire information about the uncertain characteristics and can acquire information about these characteristics only if contacted by a broker.

To capture these ideas simply, it is assumed that each consumer is described by two variables, b and q, which determine the consumer's benefit from the product as b-q. The *gross benefit* parameter $b \in (c, c+Q)$ is known initially to the consumer since it depends upon those characteristics about which the consumer is informed. All consumers have the same gross benefit parameter b: they are homogeneous with respect to the characteristics which they know initially.[3] The *mismatch* parameter q depends upon the characteristics about which a potential consumer is initially uninformed. The consumer knows only that q is distributed on [0,Q] with distribution F, density f, and mean $Eq = \mu$. To bring out the implications of the alternative remuneration systems most sharply it usually will be assumed that q is uniformly distributed.[4]

The price of the product is p.[5] Each potential consumer is contacted by at most one broker. If contacted, the consumer is given information that enables him to discover his q. The informed potential consumer buys the product if the benefit from it exceeds the price: $b-q \geq p$. Hence, the probability of purchase by an informed contact is

$$\Pr[q \leq \hat{q} \equiv b-p] = F(b-p). \tag{1}$$

[3] Consumers who are heterogeneous with respect to b are considered below.

[4] These are the standard specifications of preferences used in many Hotelling product differentiation models. The difference here is that there is only one type of product. See Schlesinger and Schulenburg (1993) for an example in insurance with similar preferences but different information assumptions.

[5] Assuming that the price of the product is fixed at p for all contacts rules out commission splitting (which is currently illegal in most U.S. states (Crosby, Evans, and Jacobs, 1991). If the broker discovers the contact's q and realizes that he will not buy at the price p, she would prefer to split her commission with the contact rather than forego the sale. Commission splitting would increase the broker's expected revenue but would still leave contacts who had $q < \hat{q}$ with a positive consumer surplus. The comparison of the remuneration systems would not be substantively different.

We are also assuming that insurers will not sell directly to informed or ignorant consumers at a price less than p. The product price for units sold via brokers under the fee regime is c so that this assumption is obviously sensible under the fee regime. Under the commission regime there are a variety of reasons why the consumer will face the same price on units bought via brokers and direct from firms. First, brokers may refuse to contract with a firm that is willing to reduce the price to consumers which contacted it directly. Since the products are identical, an individual broker is not harmed by such a refusal. Second, if consumers bear the costs of contacting product companies, the analysis in Diamond (1971) implies that each product company will set a price which maximizes (p-c)F(b-p), and this is the same as the equilibrium price for units sold via brokers (see the section on the commission system). Introducing costs of contacting firms would reduce the surplus of contacts who buy direct but would not alter the qualitative results.

Table 1
Notation

N	Number of consumers
$b \in (c,c+Q)$	Gross benefit to consumer
$q \in [0,Q]$	Mismatch of product and consumer
$F(q),f(q)$	Distribution, density functions of mismatch
$\mu = Eq$	Expected mismatch
p	Price of product
$U_I(p,b)$	Expected consumer surplus of informed consumer
$U_G(p,b)$	Expected consumer surplus of ignorant consumer
$A(p,b)$	Value of advice to consumer
c	Constant marginal cost of product
$\delta(p,b)$	Indicator function for purchase by ignorant consumer
n	Number of brokers in industry
$K(n)$	Broker's cost of achieving a contact
$w(n)$	Reservation wage (opportunity cost) of marginal broker
r	Broker's income
k	Commission paid for a sale
α	Fee for advice
$D(\alpha)$	Demand for advice (probability of advice purchase)
B	Upper limit of distribution of gross benefit
$H(b)$, $h(b)$	Distribution, density function of gross benefit
λ	Measure of broker lying about mismatch
$S(p,n)$	Welfare function

The expected consumer surplus from the product for potential consumers who are contacted and informed by a broker is

$$U_I(p;b) = \int_0^{q}(b-p-q)dF. \tag{2}$$

If not contacted by a broker, an uninformed potential consumer will buy the product direct from a product firm at the end of the period if the expected consumer surplus is nonnegative:

$$E(b - p - q) = b - p - \mu \geq 0. \tag{3}$$

It is useful to define the function

$$\delta = \delta(p;b) = 0 \text{ if } b-p-\mu < 0$$
$$= 1 \text{ if } b-p-\mu \geq 0$$

to indicate whether uninformed potential consumers buy the product. Using the indicator function, the expected consumer surplus from the product of an uninformed consumer who is not contacted by a broker is

$$U_G(p;b) = \delta(p;b)(b-p-\mu), \tag{4}$$

and the total number of units sold to informed and uninformed consumers is (N-n)δ+nF.

Brokers

There is unimpeded entry into broking. Each broker contacts one potential customer and incurs two types of cost. All brokers incur a cost K(n) of achieving a contact where n is the number of brokers in the industry, and $K'(n) \geq 0$. When $K'(n) > 0$, additional brokers exert detrimental external effects on existing brokers. Think of the passive potential consumers as a free access pool of "fish" waiting to be hooked by brokers whose efforts interfere with each other, as in Goldberg (1986).[6] We consider the case in which $K' = 0$ in order to distinguish the roles of consumer passivity and congestion as sources of inefficiency. Brokers also incur an opportunity cost or reservation wage w. Arranging potential brokers in nondecreasing order of their reservation wage yields the reservation wage function w(n) ($w'(n) \geq 0$), which gives the reservation wage of the marginal (nth) broker.

Before contacting a potential consumer, a broker knows the gross benefit b of potential consumers and the mismatch distribution F(q). When contacting a potential consumer, a broker discovers the mismatch and informs the consumer of the realized value of his or her q. To focus initially on the implications of the remuneration systems on the prices of advice and the product, it is assumed (until the penultimate section) that brokers have a very high psychic cost of dishonesty and always honestly inform the contact about the realized value of q. Thus, the same quality of information is provided under the commission and fee-for-advice systems.

The broker's income is r (the determination of r under the commission and fee-for-advice systems is examined in the next two sections). With free entry and exit, equilibrium requires that the income from broking of the marginal broker is equal to that broker's reservation wage w:

$$r - K(n) - w(n) = 0, \tag{5}$$

and the equilibrium number of brokers is[7]

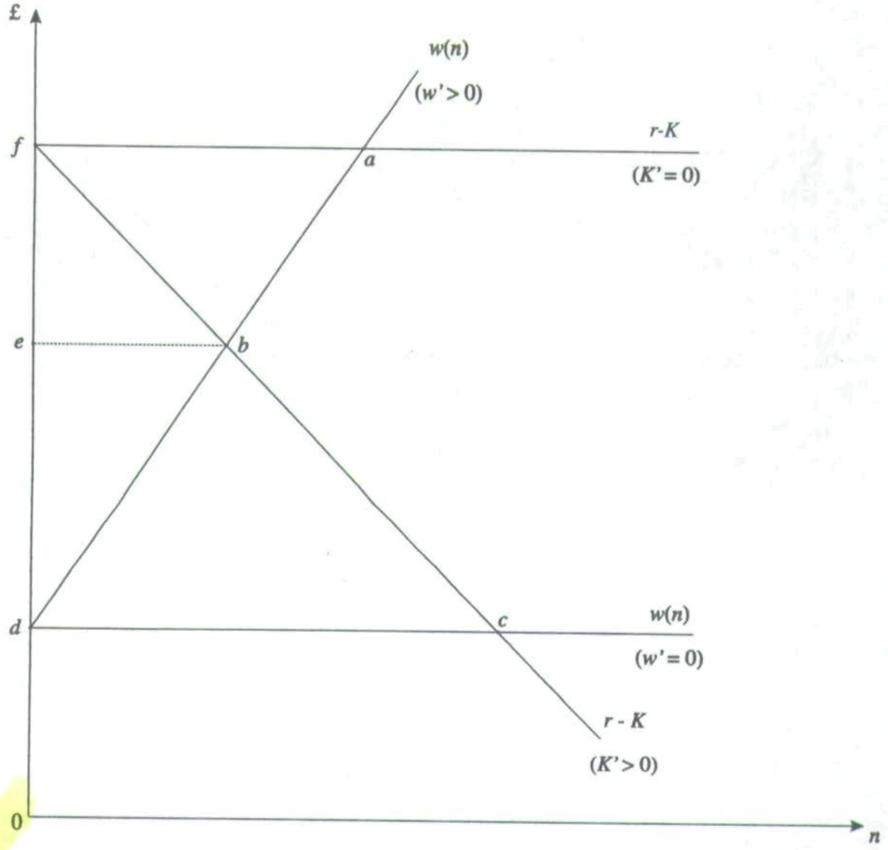
$$n = n(r), \qquad n'(r) > 0. \tag{6}$$

Figure 1 shows three different equilibrium configurations depending on whether there is congestion and whether the reservation wage is increasing in n. When there is no congestion ($K' = 0$, $w' > 0$), the equilibrium is at a, where

[6] See Gravelle (1991, 1993) for analyses of the implications of broker congestion. Results are not significantly altered if brokers can contact more than one potential consumer nor if costs vary with the effort put into finding contacts.

[7] Use of the implicit function theorem requires that there is congestion ($K' > 0$) or an increasing reservation wage function ($w' > 0$).

Figure 1
Types of Equilibria in Broker Market



the total rent earned by brokers is afd. When there is congestion and an increasing reservation wage (K' > 0, w' > 0), the equilibrium is at b, and total rent earned is bed. With a constant reservation wage and congestion, the equilibrium is at c, where the entry of brokers dissipates all the rent.

First-Best Allocation

Although the *comparative institutional* welfare analysis approach of examining the relative efficiency of the commission and fee-for-advice systems is adopted, it is useful to examine briefly the first-best allocation as a benchmark. If it is possible to show that one system satisfies the first-best criteria and that the other does not, the comparative institutional approach is greatly simplified. The conditions for a first-best allocation may also help illuminate the unusual nature of the industry.

Consider a regulator whose welfare criterion is the unweighted sum of the expected surpluses of the (N-n) uninformed potential consumers, the n informed potential consumers, the n brokers, the firms, and taxpayers. We are thus tacitly assuming that nondistorting lump sum taxes are available elsewhere in the economy to finance the regulator's policy in order to focus on efficiency and neglect distributional issues.[8]

The regulator is assumed to be subject to the constraints that product firms must at least break even and that the number of brokers is determined by their expected income as in equation (6). The regulator does not know the mismatch q for any given potential consumer although she does know its distribution. The regulator is also subject to the constraint that brokers are the only means of informing potential consumers.

For the purposes of deriving the first-best efficiency conditions only, assume that the regulator can levy a tax t on every unit of product sold and that brokers are remunerated by the regulator, rather than by firms (as under a commission regime) or consumers (as under a fee-for-advice regime). The regulator pays each broker an income of r financed by taxpayers.

The sum of the surpluses of potential consumers, firms, brokers, and taxpayers is

$$\begin{aligned} S &= (N-n)U_G(p;b) + nU_I(p;b) + (p-c-t)[(N-n)\delta(p;b) + nF] \\ &\quad + n[r-K] - \int_0^n w(\tilde{n})d\tilde{n} + \{[(N-n)\delta(p;b) + nF]t - nr\}, \end{aligned} \tag{7}$$

where the last term in braces is the net contribution to the public sector budget surplus generated from the product tax and the payments to brokers. Netting out the tax terms and the payments to brokers gives[9]

$$S = (N-n)U_G(p;b) + nU_I(p;b) + (p-c)[(N-n)\delta(p;b) + nF] - nK - \int_0^n w(\tilde{n})d\tilde{n}, \tag{8}$$

which expresses welfare as the sum of the surpluses of the uninformed potential consumers, the informed contacts, and the combined surplus of the suppliers: the firms and the brokers.

Welfare depends on the number of potential consumers who buy the product and on whether they are informed or uninformed when they buy. Thus, welfare varies with the product price and the number of brokers, who are assumed to be the only means by which consumers can become informed. Since the regulator can control the product price via t (competition ensures that firms break even and p = c+t) and the number of brokers (via r and equation (6)), a first-

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[8] The implications of alternative regimes for potential consumers who are heterogeneous with respect to their gross benefits b as well as their mismatch parameters q is considered in a later section.

[9] The price consumers pay to firms for the product could also be netted out, but it would be more difficult to relate equation (8) to the particular forms of the welfare function under the commission and fee regimes.

best allocation can be achieved by setting t and r so that the partial derivatives of S with respect to p and n are equal to zero:[10]

$$S_p = -(p-c)nf = 0. \tag{9}$$

$$\begin{aligned} S_n &= U_I(p;b) - U_G(p;b) + (p-c)(F-\delta) - K - nK' - w \\ &= U_I(p;b) - U_G(p;b) - K - nK' - w = 0. \end{aligned} \tag{10}$$

The first-best product price is marginal cost. The first-best number of brokers equates the sum of the gain to an additional consumer from being informed (U_I-U_G) to the social cost of an additional broker (K + nK' + w).

Commission System

Under the commission system a broker is paid k per sale by the product company and has an expected revenue

$$r^k = r(p,k) = kF(b-p) \tag{11}$$

and an expected income from broking of r(p,k) - K(n).[11] *Ceteris paribus* increases in the commission increase broker income and, from equation (6), attract more brokers into the industry. The supply of brokers is decreasing in the product price because a higher price reduces the probability of a sale once contact has been made and so reduces the broker's expected income.

Equilibrium under the Commission System

Product companies compete for brokers through the expected revenue r(p,k) their package of price and commission (p,k) offers the brokers who sell it. Since r(p,k) is increasing in k and decreasing in p, product companies cannot offer brokers a package (p,k) that makes a profit on sales (p-c-k > 0) and maximizes r(p,k). If r is not maximized, some company can attract all the brokers by offering them a better (p,k) package. Thus, the Nash equilibrium packages offered to brokers maximize the expected revenue of a broker, subject to companies breaking even on sales:

$$p = c + k. \tag{12}$$

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[10] Substituting p = c+t and n = n(r) in equation (8), the first-order conditions with respect to the policy instruments t and r are $S_p dp/dt = 0$ and $S_n n'(r) = 0$. Hence, since dp/dt = 1 and n'(r) > 0, we get the conditions in the text on p and n. The first-best product tax is zero, and the required income nr paid to brokers is financed by taxpayers via nondistorting lump sum taxes elsewhere in the economy. The assumption $b \in (c,c+Q)$ means that we do not have to allow for the fact that δ, and therefore S, is not differentiable at $p = b + \mu$.

[11] This specification of the commission system captures the distinctive feature of a commission regime that the broker's income depends on whether she or he sells the product. Actual commission structures are much more complicated because of the principal-agent problem between firms and brokers, arising in part from the distinction between new and repeat business and the risks insured (Puelz and Snow, 1991).

The effects of p and k on the number of brokers in the industry are ignored by individual companies and brokers.[12]

The commission equilibrium is summarized in Table 2. The assumption that $b \in (c,c+Q)$ implies that there always exists a commission level such that there is a positive probability of a sale. Substituting equation (12) into equation (11) and using the assumption that the mismatch q is uniformly distributed on [0,Q], the commission that maximizes $r(c+k,k)$ is

$$k = \tfrac{1}{2}(b-c), \tag{13}$$

so that the maximized broker revenue per contact under the commission system is

$$r^k = \frac{(b-c)^2}{4Q}, \tag{14}$$

and the equilibrium number of brokers is $n^k = n(r^k)$.

Table 2
Comparison of Commission and Fee-for-Advice Regimes with Homogeneous Consumers

Variable	*Commission Regime*	*Fee-for-Advice Regime*
p	$\tfrac{1}{2}(b+c)$	c
α	0	$\tfrac{1}{2Q}(b-c)^2$ if $b \in (c,c+\tfrac{1}{2}Q)$
		$\tfrac{1}{2Q}[Q-(b-c)]^2$ if $b \in (c+\tfrac{1}{2}Q, c+Q)$
r	$\tfrac{1}{4Q}(b-c)^2$	α
U_I	$\tfrac{1}{8Q}(b-c)^2$	$\tfrac{1}{2Q}(b-c)^2$
$U_I-\alpha$	$\tfrac{1}{8Q}(b-c)^2$	$\max(b-c-\tfrac{1}{2}Q,0)$
U_G	0	$\max(b-c-\tfrac{1}{2}Q,0)$

The product price is

$$p^k = \tfrac{1}{2}(b+c). \tag{15}$$

Informed consumers buy if their $q \le (b-p) = \tfrac{1}{2}(b-c)$ and get a consumer surplus of b-p-q. The expected consumer surplus of a contacted, and therefore informed, potential consumer is

$$U_I(p;b) = \int_0^{\hat{q}} (b-p-q)\,dF = \frac{(b-c)^2}{8Q}. \tag{16}$$

[12] The equilibrium is a Bertrand equilibrium in that the product companies compete via the price of the product and the commission rate for brokers and through them for consumers. Note that, because brokers are the only means of making sales, competition among firms for brokers is equivalent to competition for consumers.

This leads to:

Proposition 1. The equilibrium of the commission system is inefficient compared with the first-best allocation.

The product price is too high, since it exceeds the marginal cost of the product by the amount of the commission. Indeed, from equation (15) and the assumption that $b < Q$, the product price is so high that uninformed potential consumers do not buy the product:[13]

$$b - p - \mu = b - \tfrac{1}{2}(b+c) - \tfrac{1}{2}Q = \tfrac{1}{2}[b-c-Q] < 0.$$

Thus, $\delta = 0$ and $U_G(p^k;b) = 0$ and the marginal social value of a broker at the commission equilibrium is[14]

$$S_n(p^k;n^k) = U_I(p^k;b) + (p-c)F - K - nK' - w = U_I(p^k;b) - nK'. \quad (17)$$

The equilibrium number of brokers is inefficient since it is determined by the free entry equilibrium condition (5), rather than by $S_n = 0$. The marginal broker considers only the rent r-K-w and ignores both $U_I(p;b)$, which is the benefit accruing to an additional informed potential consumer, and nK', which is the additional costs the broker imposes on the other brokers. The equilibrium of the commission system may have too few or too many brokers compared with the first-best allocation.

It is also possible to prove

Proposition 2. The equilibrium of the commission system is second-best inefficient.[15]

It is possible for a regulator who can impose a tax or subsidy on the product *or* can control the commission to increase welfare compared with the equilibrium. These issues are not pursued here; our concern is the relative efficiency of alternative broker remuneration systems, rather than policies to improve the efficiency of a given remuneration system.

Fee-for-Advice System

Under a fee-for-advice system, brokers are paid a fee by the potential consumers they contact and receive no commission from product companies. Since product companies are not paying commissions to brokers, the product price under the fee system is

$$p^a = c. \quad (18)$$

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[13] With a nonuniform distribution the assumption that $b \in (c,c+Q)$ would not rule out purchases by uninformed consumers under the commission regime. However, since the price is higher under the commission regime than under the fee regime, it is always the case that expected consumer surplus of uninformed consumers is greater under the fee regime. The welfare comparisons below will not therefore be qualitatively affected.

[14] The last step follows because $(p-c)F = kF = r$, and equation (5) holds at the equilibrium.

[15] See Gravelle (1991) where it is also demonstrated that it is possible for the commission equilibrium to be worse than the allocation produced by a cartel of firms.

Although the product is priced at its first-best level, the efficiency of the system also depends upon the number of potential consumers who buy the product and the price they pay for advice.

When contacting a potential consumer, a broker offers to sell information about the product for a fee of α. If the offer is accepted, the potential consumer discovers his or her q and decides whether to buy the product. He or she buys the product if

$$b - p^a - q = b - c - q \geq 0.$$

The probability of a purchase by an informed potential consumer (a contact who has bought advice from a broker) is $F(\hat{q}) = F(b\text{-}p) = F(b\text{-}c)$. The expected utility from being informed under the fee system is

$$U_I(p^{\,a};b) = U_I(c;b) = \int_0^{\hat{q}}(b-c-q)dF = \frac{(b-c)^2}{2Q}. \tag{19}$$

Potential consumers who are not contacted by a broker, or who do not buy advice if contacted, will purchase the product if their expected consumer surplus on the product is nonnegative. The expected consumer surplus of an uninformed consumer under the fee system is

$$U_G(c;b) = \delta(p^a;b)(b-p^a-\mu). \tag{20}$$

Demand for Advice

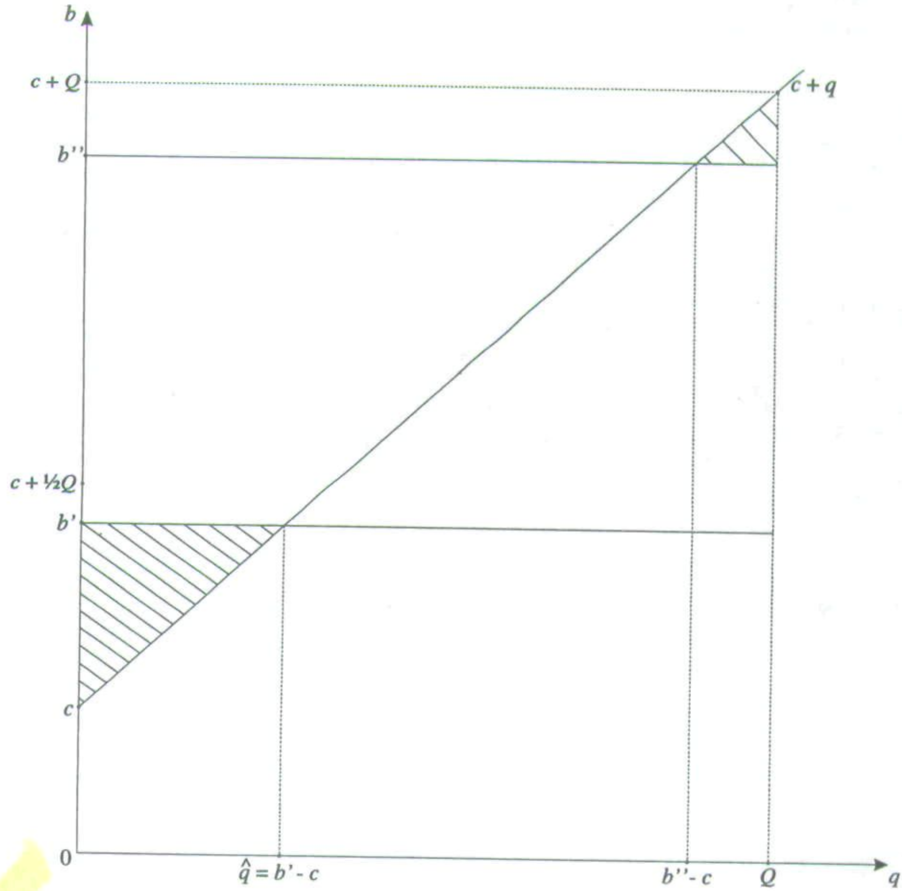
The value of advice to a potential purchaser of the product when the price is p is $A(p;b)$. It is the consumer's increase in expected utility from knowing his or her q, rather than knowing only the distribution of q. Since the product price under the fee system is c, we have, from equations (19) and (20),

$$\begin{aligned} A(p^a;b) &= U_I(p^a;b) - U_G(p^a;b) \\ &= (b\text{-}c)^2/2Q,\ b \in (c,c+\mu] \\ &= (Q\text{-}(b\text{-}c))^2/2Q,\ b \in (c+\mu,Q). \end{aligned} \tag{21}$$

If $b \in (c, c+\mu)$, uninformed consumers will not buy the product and so $U_G(c;b) = 0$. The expected surplus of an informed potential consumer is $U_I(c;b)$. Information is of value to an informed consumer because, if $q \leq \hat{q}$, the consumer will make a purchase he or she would not have made otherwise. In Figure 2 the value of information when b = b' is 1/Q times the triangle below the b' line and above the c+q full cost line. The value of information *increases* with the square of b over this range: the expected consumer surplus of an informed potential consumer is the product of the probability that the consumer will buy if informed ($\hat{q}/Q = (b\text{-}c)/Q$) and the expected consumer surplus conditional on purchase ($b\text{-}c\text{-}\frac{1}{2}\hat{q}$).[16]

[16] Note that, for $b \in (c,c+\mu)$, increases in the price of the product reduce the demand for advice. Since an increase in the price of advice cannot increase and may reduce the number of contacts buying advice, and only informed potential consumers buy the product, increases in the price of advice cannot increase and may reduce the demand for the product. Hence, if the con-

Figure 2
Value of Information



If the potential consumers have $b \in (c+\mu, c+Q)$, they will buy the product even if they are not informed and have an expected surplus of $U_G(c;b) = b-c-\mu$. If informed, they get

$$U_I(c;b) = \frac{(b-c)^2}{2Q} > b-c-\tfrac{1}{2}Q = U_G(p;b).$$

Information is of value in this case because it may lead consumers to decide not to make a purchase they would have made otherwise. The informed consumer's gain is the product of the probability that she or he would not buy if

sumers' gross benefit parameter is in the range $b \in (c,c+\mu)$, the product and advice are complements.

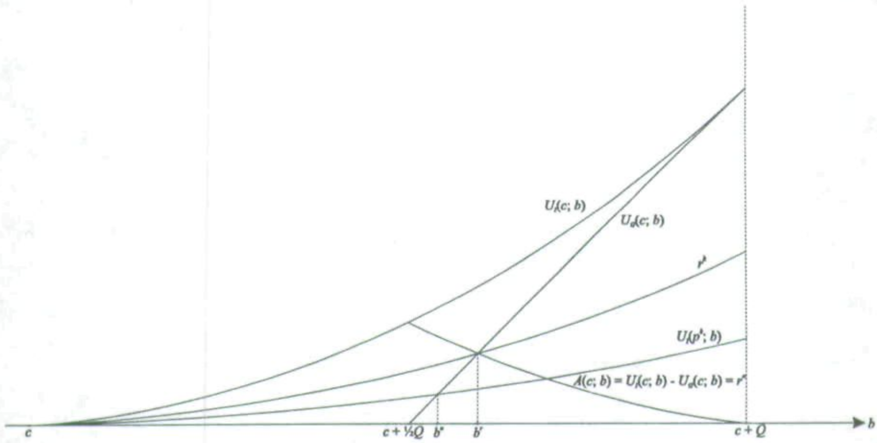
informed [(Q-q̂)/Q] and the expected loss conditional on buying if he or she should not have done so [b-c-½(Q-q̂)].

In Figure 2, the value of information to a consumer with b = b" is 1/Q times the shaded area. Increases in b in this range reduce the value of information because they reduce the probability that an uninformed purchase is a mistake and the expected loss if it is.[17]

Figure 3 shows the value of information at different levels of the gross benefit parameter b. The curve $U_I(c;b)$, plotting the expected consumer surplus to an informed consumer, is an increasing quadratic function of b (see equation (19)). The curve $U_G(c;b)$, showing the expected consumer surplus of an uninformed consumer, is the horizontal axis up to c+½Q and a straight line with slope of one thereafter. The value of information is A(c;b): the vertical distance between $U_I(c;b)$ and $U_G(c;b)$, which increases with b up to c+½Q and then decreases.

Figure 3

Commission Versus Fees: Homogeneous Consumers



Equilibrium under Fee-for-Advice System

Since we assume that consumers are essentially passive under both remuneration regimes, a broker will exploit her monopoly position with the potential consumer she has contacted. Under a fee system, the broker will charge a fee that maximizes expected revenue from selling advice. When all consumers have the same gross benefit b parameter, all consumers place the same value on advice. The broker will therefore charge a price for advice which is equal

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[17] Note that, if either b < c or b > c+Q, information does not change potential consumers' decisions and is therefore of no value. In the former case the potential consumers would not buy whatever their q and in the latter would always buy whatever their q.

to the contact's expected gain from information, and all contacts will buy the advice, giving the broker a revenue under the fee system of

$$r^a = \alpha = A(c;b) = U_I(c;b) - U_G(c;b). \tag{22}$$

The number of brokers selling advice in the industry will then be determined by the break-even condition

$$r^a - K(n) - w(n) = 0$$

as $n^a = n(r^a)$.

Efficiency of Fee-for-Advice System

Under the fee system, contacted potential consumers pay a fee of α for advice and then make an informed decision whether to purchase. From equation (22), their expected surplus from buying advice and then making an informed choice is

$$U_I(c;b) - \alpha = U_I(c;b) - A(c;b) = U_G(c;b), \tag{23}$$

so that the brokers' exploitation of their monopoly position leaves the n^a contacted consumers no better off than if they were uninformed. The total surplus of all consumers is just $NU_G(c;b)$ and welfare under a fee system is

$$\begin{aligned} S^a = S(c;n^a) &= NU_G(c;b) + n^a[r^a - K(n^a)] - \int_0^{n^a} w(\tilde{n})d\tilde{n} \\ &= (N-n^a)U_G(c;b) + n^aU_I(c;b) - n^aK(n^a) - \int_0^{n^a} w(\tilde{n})d\tilde{n}. \end{aligned} \tag{24}$$

The product price under the fee system is at its first-best level, but the marginal value of an additional broker at the fee equilibrium is

$$S_n(c;n^a) = U_I(c;b) - U_G(c;b) - K - w - n^aK' = r^a - K - w - n^aK' = -n^aK'. \tag{25}$$

This suggests the following:

Proposition 3. If there are congestion costs, the equilibrium of the fee-for-advice system is not first- or second-best efficient.

Because brokers know that all consumers have the same gross benefit b, and therefore the same valuation of advice, they can extract all the gain from providing information. Hence, unlike the commission system, they internalize all the gains to consumers from their entry to the industry. But brokers ignore the effect of their entry on the costs of other brokers and, if there are congestion effects, there will be too many brokers in the industry.[18]

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[18] A regulator who could control the price of advice could achieve a first-best allocation by a suitable reduction in α, which would reduce the number of brokers. A regulator who could not directly control the price of advice but who could tax or subsidize the price of the advice, could also effect a welfare increase. The price of advice, and thus the number of brokers, could be reduced by a tax on the product if $b < c + ½Q$ or a subsidy if $b > c + ½Q$.

Comparison of Commission and Fee-for-Advice Systems

Despite the fact that the product is priced at marginal cost under the fee system and above marginal cost with the commission system, we cannot conclude that the fee system is better. The reasons are most clearly brought out by considering the three possible equilibrium configurations shown in Figure 1 with the aid of Figures 3 and 4 and Table 2.

Congestion and Constant Reservation Wage

When the reservation wage of brokers is constant ($w' = 0$), the rents brokers earn by exploiting consumers' passivity are entirely dissipated by entry. The welfare comparison of the alternative systems can then be judged solely by their effect on potential consumers.

In Figure 3, the curve $U_I(p^k;b)$ plots the expected surplus of contacted potential consumers under the commission system for different values of the consumers' gross benefit parameter b. Under the fee system, a contact has an expected surplus, net of the fee, of $U_G(c;b)$ (see equation (23)). Contacted potential consumers are better (worse) off under the commission system if

$$b<(>)b^{u} \equiv c+Q(4-2\sqrt{3}). \tag{26}$$

Potential consumers who are not contacted never buy under the commission system (and so have $U_G(p^k;b) = 0$). Under the fee system, the product price is smaller and noncontacts will buy if $b \geq c + \frac{1}{2}Q$. The expected surplus of noncontacts under the fee system is $U_G(c;b)$. Noncontacts are better off under the fee regime if $b > c + \frac{1}{2}Q$.

The broker's expected revenue per contact under the commission and fee system is represented in Figure 3 by r^k and r^a. Brokers get a greater (smaller) revenue under the fee system if

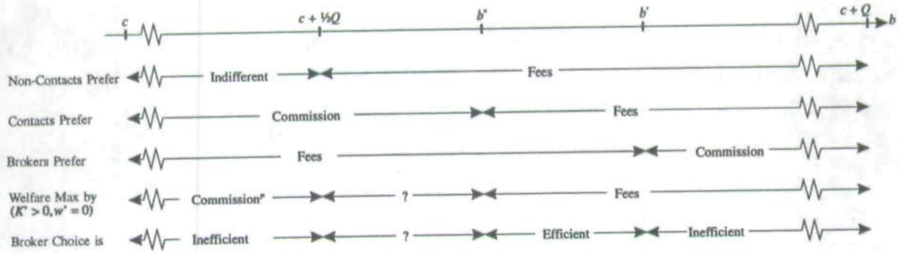
$$b<(>)b^{r} \equiv c+Q(2-\sqrt{2})>b^{u}. \tag{27}$$

We will assume that the remuneration system that is chosen in the absence of regulation is that which maximizes the expected revenue per contact.

There are four possible values of the gross benefit parameter of interest (see Figure 4).

Figure 4

Commission Versus Fees: Homogeneous Consumers



Case (i): $b \in (c, c + \frac{1}{2}Q)$. Under the fee system, noncontacts do not buy and contacts have a zero expected surplus after paying the fee α. The brokers extract all gains from information provision, but these are entirely dissipated by free entry because the reservation wage is constant. Under the commission system, noncontacts do not buy, but the expected surplus of contacts is positive. Even though free entry dissipates the rent of brokers, the commission system is more efficient than the fee-for-advice system because it generates a positive total surplus:

$$S^k = n^k U_I(p^k;b) > S^a = 0. \tag{28}$$

Brokers would prefer the fee system and if the choice between systems is determined by the brokers' expected revenue, the inefficient remuneration system will be chosen.

Case (ii): $b \in (c + \frac{1}{2}Q, b^u)$. Over this range, the fact that under the fee system uninformed potential consumers would buy the product means that the fee charged for advice leaves contacts with a positive expected surplus, equal to the expected surplus of noncontacts. Under the commission system, the higher price means that all noncontacts and a larger proportion of contacts do not buy. However, the expected surplus of contacts is larger under the commission system and so the welfare comparison is ambiguous without detailed information on the broker supply function n(r) as well as the surpluses of consumers:[19]

$$S^k - S^a = n^k U_I(p^k;b) - NU_G(c;b). \tag{29}$$

Case (iii): $b \in (b^u, b^r)$. Here, contacts prefer the fee system:

$$U_I(c;b) - \alpha = U_G(c;b) > U_I(p^k;b).$$

Since noncontacts are also better off ($U_G(c;b) > U_G(p^k;b) = 0$) and broker rents are dissipated, the fee-for-advice system is more efficient:

$$S^k = n^k U_I(p^k;b) < NU_I(p^k;b) < NU_G(c;b) = S^a. \tag{30}$$

Brokers get a larger expected revenue under the fee system, and so brokers would choose the more efficient system.

Case (iv): $b \in (b^r, c+Q)$. The fee-for-advice system is again more efficient over this range but now brokers would receive larger expected revenue from the commission system. Hence, brokers would choose the less efficient system.

Increasing Reservation Wage and No Congestion

If there are no congestion costs ($K' = 0$), the entry of brokers does not lead to any dissipation of rents. The fee-for-advice system is then first-best efficient at all b since the product is priced at marginal production cost and the number of brokers satisfies

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[19] When $w' = 0$, n is smaller the greater the constant reservation wage w. A reduction in the number of brokers has no effect on $S^a = NU_G(c;b)$ but reduces $S^k = nU_I(p;b)$.

$$S_n(c,n^a) = -n^a K' = 0.$$

A broker appropriates all of his or her contact's expected surplus under the fee system, and, since there are no congestion effects, all the welfare effects of the entry decision are internalized by the broker. The commission system has too high a price and too few brokers. If the remuneration system is determined by the expected revenue of brokers, the efficient fee-for-advice system is chosen when $b < b^r$, but if $b > b^r$, the inefficient commission system is used.

Congestion and Increasing Reservation Wage

With $w' > 0$, brokers earn positive rents in equilibrium. Even when $b \in (c, c+\frac{1}{2}Q)$, so that consumers have a zero surplus under the fee system, the fee system may be better than the commission system if congestion costs are not too large. In this range, the total rent of brokers is larger under the fee system, and this may offset the greater surplus of the consumers from the commission system. The opposite is true when $b > b^r$. Welfare conclusions require extremely detailed specification of the reservation wage and congestion cost functions.

The welfare comparisons can be summarized in

Proposition 4. The welfare-maximizing regime does not always maximize broker income and therefore may not be chosen. If there are broker congestion costs, the commission system may generate higher welfare than the fee-for-advice system.

Heterogeneous Potential Consumers

The assumption that all potential consumers have the same gross benefit b appears to drive several of the conclusions in the previous section. When they have the same gross benefit, all potential consumers place the same value on advice, and brokers set a fee equal to the value of advice and so internalize all the benefits their advice produces. When there are no congestion effects, the fee system is consequently first-best efficient. When broker rents are entirely dissipated and $b \in (c, c+\frac{1}{2}Q]$, the fee system is worse than the commission system, which at least leaves the potential consumers with some surplus.

In this section, we assume that potential consumers are heterogeneous with respect to b, so that some purchasers of advice have a positive surplus. As well as comparing the welfare implications of the two remuneration systems, we investigate their effects on the different types of potential consumers.

We retain all the features of the model presented above except that now the gross benefit of the product b is distributed across the population, independently of the mismatch distance q, with distribution H(b) and density h(b). For simplicity, we assume that b is distributed uniformly on [0,B], with $B \in (c,c + \frac{3}{4}Q)$. As in earlier sections, each consumer knows his or her b but is initially ignorant of his or her q. Brokers initially only know the distributions of b and

q. When contacting a potential consumer, a broker discovers the consumer's q but gains no information on b.[20]

Commission System

The probability of a sale to an informed potential consumer is

$$Z_I = \int_0^B F(\tilde{b}-p)h(\tilde{b})d\tilde{b} = \frac{(B-p)^2}{2QB}. \tag{31}$$

Maximization of the broker's expected revenue per contact $r = kZ_I$ subject to $p = c+k$ yields the equilibrium price under the commission system as

$$p^k = \frac{B+2c}{3}. \tag{32}$$

The maximized revenue is

$$r^k = \frac{2(B-c)}{27QB}. \tag{33}$$

The expected consumer surplus of a type b contact is

$$U_I(p^k;b) = \int_0^{\hat{q}} (b-p^k-q)dF = \frac{(b-p^k)^2}{2Q} = \frac{(3b-B-2c)^2}{18Q}. \tag{34}$$

Since a contact with $b < p$ does not buy the product whatever his mismatch q, the expected consumer surplus of a potential consumer who is contacted by a broker is

$$V_I(p;B) = \int_p^B U_I(p;b)dH = \frac{(B-p)^3}{6BQ} = \frac{4(B-c)^3}{81BQ} = \frac{2}{3}r^k. \tag{35}$$

Welfare under the commission system is the unweighted sum of the surpluses of contacts, brokers, and firms.[21] Netting out the commission payments,

$$S^k = n^k V_I(p^k;B) + (p^k-c)n^k Z_I - n^k K(n^k) - \int_0^{n^k} w(\tilde{n})d\tilde{n}. \tag{36}$$

Since $p^k > c = p^a$, the commission system has a worse price than the fee system. The marginal social value of a broker at the commission equilibrium is

$$S_n^k = V_I - nK' \tag{37}$$

and so

Proposition 5. The commission system is second-best inefficient if consumers have different gross benefits.

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[20] If b is a vector of characteristics, we could more realistically, but at the cost of simplicity, assume that the broker can observe some, but not all, of them before the price for advice or the product is fixed.

[21] Noncontacts do not buy under the commission system as $b \leq B < p^k + ½Q = c + ¾Q$.

As was the case with homogeneous potential consumers, the equilibrium number of brokers may be inefficiently large or small under the commission system. The marginal broker ignores the social benefits (V_I) that are created by informing an additional potential consumer and the increase in costs the broker's entry imposes on existing brokers.

Fee-for-Advice System

The value of advice to a type b contact is given by equation (21). A contact buys advice at a fee of α if $A(p;b) = A(c;b) \geq \alpha$. Using equation (21), individuals with $b \leq c+\frac{1}{2}Q$ buy advice if

$$b \geq b^- \equiv c+\sqrt{\alpha 2Q},$$

and those with $b \geq c+\frac{1}{2}Q$ buy advice if

$$b \leq b^+ \equiv c+Q-\sqrt{\alpha 2Q}.$$

Hence, the probability that a contact will buy advice at a fee of α (the demand for advice) is

$$D = D(\alpha) = H(b^+) - H(b^-),$$

which is decreasing in α, so that brokers face a downward-sloping demand curve for advice.

The broker's expected revenue from selling advice is $r = \alpha D(\alpha)$. Table 3 shows the advice fee α which maximizes r, the resulting demand, and the expected revenue for different ranges of the distribution parameter B.[22] Note that the fee-for-advice and broker revenue increase with B up to $B = c + \frac{3}{5}Q$ and decline thereafter. As we saw in the advice section, the amount that individuals are willing to pay for advice increases with their gross benefit b up to $c + \frac{1}{2}Q$ and then declines. When B is close to $c + \frac{1}{2}Q$, increases in B raise the probability that a contact will have a value of b close to $c + \frac{1}{2}Q$ and therefore place a high value on advice. Thus, initially as B increases beyond $c + \frac{1}{2}Q$, the revenue maximizing fee and the revenue increase. As B increases further, there is a greater probability of a contact placing a low value on advice, because he or she has either a small b or a large b. The revenue maximizing fee eventually decreases with B and so does the brokers' revenue from selling advice. A type b noncontact will get an expected consumer surplus under the fee regime of $U_G(c;b)$, and so the expected surplus of noncontacts is

[22] The demand function $D(\alpha)$ is kinked if $B \in (c + \frac{1}{2}Q, b^+)$, resulting in a discontinuous marginal revenue function. This makes calculation of the optimal α and the resulting D, r, and the welfare comparisons tedious for some ranges of the distribution parameter. α increases with B up to $B = c + \frac{3}{5}Q$, then decreases until $B = c + \frac{2}{3}Q$ and is constant thereafter. The demand for advice increases with B up to $B = c + \frac{2}{3}Q$ and then decreases. r^a increases until $B = c + \frac{3}{5}Q$ and then decreases. Details of these calculations are in the Appendix. The broker's expected revenue is the same under the two remuneration systems for $B \in (c, c + \frac{3}{5}Q)$ because of the assumption that the distributions of b and q are uniform.

$$V_G(c;B) = \int_0^B U_G(c;b)dH = \int_{c+\frac{1}{2}Q}^B (b-c-\tfrac{1}{2}Q)dH. \tag{38}$$

Table 3

Fee-for-Advice System with Heterogeneous Consumers

	Upper Limit of Type Distribution		
Variable	$B \in [c, c+\frac{3}{5}Q]$	$B \in [c+\frac{3}{5}Q, c+\frac{2}{3}Q]$	$B \in [c+\frac{2}{3}Q, c+\frac{3}{4}Q]$
α	$\frac{2}{9Q}(B-c)^2$	$\frac{1}{2Q}(c+Q-B)^2$	$\frac{1}{18Q}$
b^-	$c+\frac{2}{3}(B-c)$	$c+Q-B$	$c+\frac{1}{3}Q$
b^+	B	B	$c+\frac{2}{3}Q$
$D(\alpha)$	$\frac{1}{3B}(B-c)$	$\frac{1}{B}[2(B-c)-Q]$	$\frac{1}{3B}Q$
r^a	$\frac{1}{27QB}(B-c)^3$	$\frac{1}{2QB}(c+Q-B)^2[2(B-c)-Q]$	$\frac{1}{54B}Q^2$

A type b contact buys advice from a broker if $b \in [b^-,b^+]$ and gets a surplus of $U_I(c;b) - \alpha$. A type b contact with $b < b^- < c + \frac{1}{2}Q$ does not buy advice and does not buy the product direct without information. A type b contact with $b > b^+ > c + \frac{1}{2}Q$ will not buy advice but will buy direct and get a surplus of $U_G(c;b)$.

Welfare is the sum of the surpluses of noncontacts, contacts who buy advice, contacts who do not buy advice but buy the product direct, brokers, and firms:[23]

$$\begin{aligned} S^a &= (N-n)V_G(c;B) + n\left\{\int_{b^-}^{b^+}[U_I(c;B)-\alpha]\,dH + \int_{b^+}^{B} U_G(c;b)dH\right\} \\ &\quad + n[\alpha D(\alpha)-K] - \int_0^n w(\tilde{n})d\tilde{n} \\ &= NV_G(c;B) + n\bar{A}(c;B) - nK - \int_0^n w(\tilde{n})d\tilde{n}, \end{aligned} \tag{39}$$

where $\bar{A}(c;B) = \int_{b^-}^{b^+} A(c;b)dH$ is the average over all contacts of the value of advice, remembering that not all will buy it.

The product price is at the first-best level, but the marginal value of a broker at the fee equilibrium is

$$S_n^a = \bar{A} - K - nK' - w = [\bar{A} - \alpha D(\alpha)] - nK'. \tag{40}$$

Proposition 6. With heterogeneous consumers, the equilibrium of the fee-for-advice system is neither first-best nor second-best inefficient, even if there are no congestion costs.

[23] We use the definition of the value of advice as $A = U_I - U_G$ and substitute

$$\int_{c+\frac{1}{2}Q}^{B} U_G(c;b)dH - \int_{c+\frac{1}{2}Q}^{b^+} U_G(c;b)dH = \int_{b^+}^{B} U_G(c;b)dH.$$

The price of advice no longer extracts all the gain to contacts from becoming informed since the expected surplus of contacts who buy advice is positive: $\bar{A} - \alpha D(\alpha) > 0$. Thus, if there are no congestion costs, the equilibrium of the fee system has too few brokers compared with the first-best level.

The first-best efficiency criterion assumes that a regulator can control separately the number of brokers and the probability that a contact will buy advice, perhaps by fixing the fee paid by contacts and the fee received by brokers differs at different levels. In a second-best situation, the regulator has fewer instruments and may have to set the same fee for brokers and contacts. We can also show that, with heterogeneous consumers, the equilibrium of the fee system is not second-best efficient in the sense that a regulator who could control the advice fee could do better than the unregulated equilibrium. Changes in the advice fee alter broker revenue and thus the number of brokers and the average value of advice to contacts who buy advice. But the equilibrium level of α maximizes broker revenue and therefore the number of brokers. Hence, at the equilibrium level of α,

$$\frac{dS^a}{d\alpha} = S_n^a \frac{dn}{d\alpha} + n\frac{d\bar{A}}{d\alpha} < 0$$

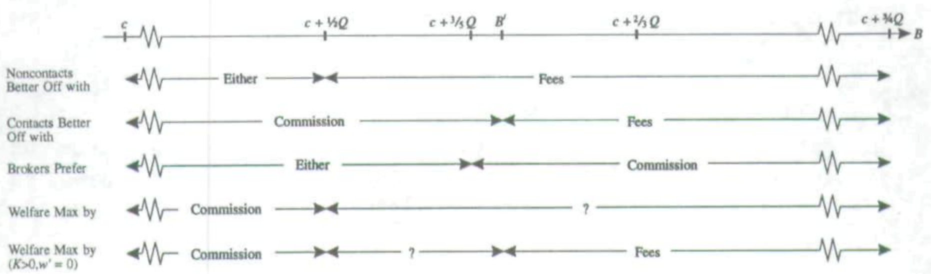
because $dn/d\alpha = 0$, and increases in the advice fee reduce the probability that a contact will buy advice and thus reduce the expected value of advice. Brokers' exploitation of the weak market position of contacts will result in an equilibrium fee that is set too high for second-best efficiency.

Welfare Comparisons

The welfare implications of the two remuneration regimes depend upon their effects on noncontacts, contacts, and brokers, as summarized in Table 3 and Figure 5. Since the product price is lower under the fee system, noncontacts are better off under the fee system if any of them buys the product. Hence, for $B \leq c+\frac{1}{2}Q$, the remuneration system has no effect on the expected utility of noncontacts, and, for $B > c+\frac{1}{2}Q$, they are, on average, better off under the fee system.

Figure 5

Commission Versus Fees: Heterogeneous Consumers



Contacts may be better or worse off with fees than with commissions. Contacts face a higher price for advice, so that not all contacts choose to become informed. But those contacts who do buy advice and then decide to buy the product gain from the lower product price. Under the commission system, all contacts get information but they face a higher product price than under the fee system.

At low values of B, the fee charged for advice extracts such a large proportion of the expected surplus of informed consumers that contacts are better off under the commission regime. However, for $B \geq c + \frac{3}{5}Q$, increases in B lead to a reduction in the fee charged for advice and, eventually, at $B = B^I$, the fee charged is low enough that contacts do better under the fee system.[24]

For $B \leq c + \frac{3}{5}Q$, brokers get the same revenue per contact under the fee and commission systems. Increases in B beyond this point continue to raise broker revenue under the commission regime but reduce it under the fee regime, so that rents, if not entirely dissipated, are larger under the commission regime for $B > c + \frac{3}{5}Q$.

The welfare comparison of the two regimes varies with the value of the distribution parameter B:

Case (a): $B \in (c, c+\frac{1}{2}Q]$. In this range, the expected revenue of brokers is equal under the two systems (see Table 3 and equation (33)) and so is the number of brokers. Brokers' costs are the same under the two regimes, and the welfare comparison is not affected by whether there is congestion. Since the number of contacts is the same under the two systems and noncontacts do not buy, the welfare comparison depends only upon the expected utility of contacts:

$$S^a - S^k = n[\bar{A}(c;B) - \alpha D(\alpha) - V_I(p;B)] = n\left[\frac{19}{12}r^k - r^k - \frac{2}{3}r^k\right] < 0.$$

For this range of the distribution parameter, only contacts buy the product. Although the product price is lower under the fee system, the commission system gives a larger surplus to contacts because all contacts are given information. Hence, if $B \in (c, c+\frac{1}{2}Q]$, the commission system is more efficient than the fee-for-advice system, irrespective of whether there are congestion costs.

Case (b): $B \in [c+\frac{1}{2}Q,\ c + \frac{3}{5}Q]$. Over this range of the distribution parameter, contacts are again better off under the commission system, and brokers get the same rent under the two systems. However, under the fee regime, noncontacts with $b \in [c+\frac{1}{2}Q, B]$ buy the product direct and the difference in welfare is now

$$S^a - S^k = (N-n)V_G(c;B) + n[\bar{A}(c;B) - \alpha D(\alpha) - V_I(p^k;B)].$$

Noncontacts are better off under the fee system because they face a lower product price and do not pay a fee for advice whatever the regime. Since contacts are better off under the commission system, the welfare comparison hing-

[24] B^I is approximately $c + 0.61Q$. See the Appendix for details of this and other calculations.

es on the broker supply function n(r). Thus, the larger are brokers' costs the more likely is it that the fee system will yield higher welfare than the commission system.

Case (c): $B \in (c + \frac{3}{5}Q, B^I)$. For $B > c + \frac{3}{5}Q$, there are more brokers under the commission regime. If w' > 0 so that rents are not entirely dissipated, there are also larger broker rents under the commission system. Contacts are also better off under the commission system. But noncontacts are better off under the fee regime, so that the welfare comparison is ambiguous.

Case (d): $B \in [B^I, c+\frac{3}{4}Q)$. Over this range of the distribution parameter, broker revenue and therefore the number of brokers and contacts is larger under the commission system than under the fee system. Noncontacts do better under the fee regime because they face a lower product price. Contacts are better off under the fee regime when $B > B^I$. Thus, when $B \geq B^I$, welfare is greater under the fee system if broker rents are entirely dissipated.

Effects on Different Types of Consumers

When potential consumers are heterogeneous, different types may prefer different systems. We can show

Proposition 7. For all values of the distributional parameter B there exists a $\hat{b} = \hat{b}(B)$ such that potential consumers with $b < \hat{b}$ prefer the commission system, and those with $b > \hat{b}$ prefer the fee-for-advice system.

Proof of this proposition is relegated to the Appendix, but we can illustrate the proposition for Case (a) in which $B \in (c, c+\frac{1}{2}Q]$. Here there are the same number of brokers under the two regimes, and the expected consumer surplus of noncontacts is zero. The type b individual prefers the fee system if and only if his or her expected utility if contacted is greater under the fee system:

$$U_I(c;b) - \alpha > U_I(p^k;b).$$

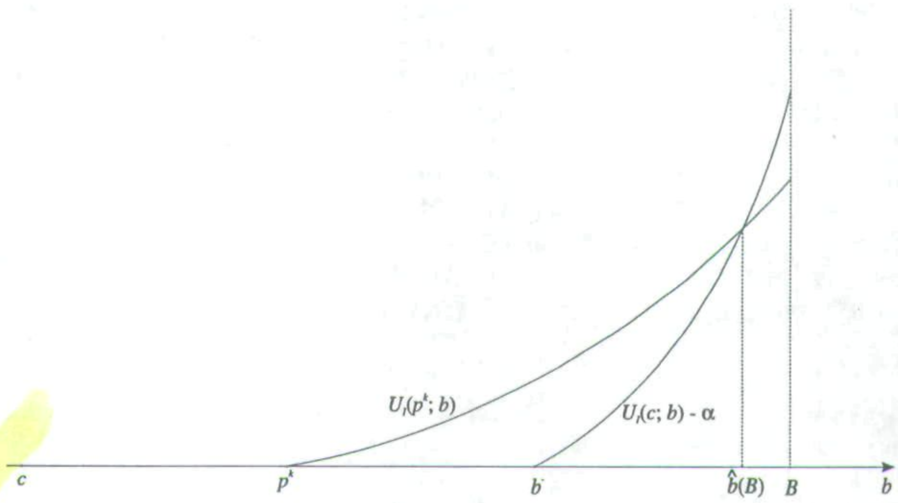
Figure 6 plots the expected utility of being a contact under the two regimes. Under the fee system, only contacts who pay the fee and get information on their q will have a positive surplus. Thus, only those individuals with $b > b^-$ will have a positive surplus. Under the commission system, contacts with $b > p^k$ will have a positive expected surplus. From Table 3 we have

$$p^k = \frac{B+2c}{3} < b^- = c+\sqrt{\alpha 2Q} = c+\frac{2(B-c)}{3} = \frac{2B+c}{3}.$$

Thus, individuals with $b \in (p^k, b^-]$ will be better off with a commission system: although the product price is higher, they would not buy advice for a fee of α and so would not be able to take advantage of the lower product price under the fee system.

Individuals with larger b are more likely to buy the product when informed and will have a greater surplus when they do buy. The expected utility of an informed individual facing a price p increases with the square of the difference between b and the product price, because the larger b-p is, the greater the probability that the individual will buy if informed and the greater the surplus if he

Figure 6
Expected Utility of Contacts



or she does. Hence, $U_I(c;b)$ will increase more rapidly than $U_I(p^k;b)$ as b increases. Referring to Table 2, we see that an individual with b = B will have

$$U_I(c;B) - \alpha = \frac{(B-c)^2}{2Q} - \frac{2(B-c)^2}{9Q} > U_I(p^k;B) = \frac{2(B-c)^2}{9Q}$$

and will prefer the fee system. Thus, there will exist a $\hat{b}$ such that all potential consumers with $b < \hat{b}$ are better off under the commission system, and those with $b > \hat{b}$ will prefer the fee system.

Advice Quality

In the above discussion, the quality of advice was held constant across the systems to focus on their price implications. Under a commission system, the advice-giver has an incentive to provide biased advice. When products are differentiated, brokers who are tied to one company may fail to inform a contact about other companies' products that might suit him or her better. Independent brokers, who are not tied to a particular company, have less incentive to bias their advice in favor of one firm, but they do have an incentive to encourage the consumer to buy the product of some company, even if the consumer would be better off not buying the product of any company.

Life insurance policies have long-delayed random payoffs. It is therefore difficult for purchasers to assess either product quality or the quality of any advice about products. Although a fee system would remove the incentive to recommend purchase of some product or of a specific product, it does not provide any incentive to provide good advice. Providing better advice is presumably more costly to brokers, and purchasers of advice will not easily be able to monitor the effort of advice-givers. The consumer's inability to observe effort or the quality of advice means that neither explicit contractual nor implicit reputation mechanisms are likely to be effective in controlling the quality of advice about life insurance products.

Such arguments suggest that, even when the incentives for advice quality are considered, it is not clear that a fee regime is preferable to a commission regime. This is certainly so if account is also taken of the implications of the different systems for the prices of the product and of the advice. To illustrate, we set out a simple model in which the commission regime results in poorer quality advice than the fee regime. The specification we adopt is simple but it captures one of the criticisms of the commission regime: that it gives brokers an incentive to persuade potential consumers to buy the product when they would be better off without it.

The model is identical to the earlier homogeneous potential consumer model except that brokers are now assumed to be able to misrepresent the characteristics of the product. Such misrepresentation results in the contact perceiving his mismatch to be q/λ instead of q. $\lambda > 1$ is a measure of the extent to which contacts can be misled or lied to. Contacts do not realize that brokers lie,[25] so the probability of a sale if a broker lies is[26]

$$\Pr[b-p-q/\lambda \geq 0] = F(\hat{q}\lambda). \tag{41}$$

Brokers are *lexicographically honest:*[27] they provide accurate information as long as doing so does not lead to a smaller expected income than they would receive by lying. Hence, under a fee-for-advice system, where brokers get paid if they sell advice, not the product, accurate information is provided to contacts who buy advice, and the advice fee equilibrium is unaffected by the possibility that brokers can lie.

Since lying increases the probability of a sale from $F(\hat{q})$ to $F(\hat{q}\lambda)$, all brokers lie under the commission system. The commission and product price will now be chosen to maximize $kF(\hat{q}\lambda)$ subject to the firms' break-even constraints. Given the assumption that q is uniformly distributed, the product price $\frac{1}{2}(b+c)$

[25] If contacts know λ and realize that brokers can lie, they would get accurate information on their true mismatch if all brokers lie to the same extent. However, if brokers differ in the amount by which they lie, even sophisticated consumers will not be able to infer their true mismatch. For example, suppose that a proportion Θ of brokers are dishonest and the remainder are honest. A contact who is told that his mismatch is $\tilde{q}$ will estimate his expected true mismatch as $\bar{q} = \Theta\tilde{q}\lambda + (1-\Theta)\tilde{q}$. Hence, the probabilities of a sale by honest and dishonest brokers are $F(\tilde{q}/(\Theta\lambda + 1 - \Theta))$ and $F(\tilde{q}\lambda/\Theta\lambda + 1 - \Theta))$, respectively. Such complications will not affect the main argument.

[26] We assume that the upper bound on q is sufficiently large that $F(\hat{q}\lambda) < 1$.

[27] More generally, we could assume that brokers have a psychic cost of dishonesty which varies across the population of brokers, so that some are honest even though they get a lower expected income. See Gravelle (1993) for an extended analysis of the commission regime with dishonest brokers.

and commission ½(b-c) are identical to those arising when brokers do not lie.[28] The brokers' expected revenue is greater:

$$r^k = \frac{\lambda(b-c)^2}{4Q} \tag{42}$$

because $F(\hat{q}) < F(\hat{q}\lambda) = \lambda F(\hat{q})$.

Since the product price is unaffected by λ, we know from the analysis with honest brokers that only contacts will buy the product. Although all contacts are misled by brokers, only a proportion are made worse off (see Figure 7). Contacts with $q \le \hat{q}$ would have bought the product even if supplied with accurate information, and they are no worse off since for them $b\text{-}p\text{-}q \ge 0$. However, contacts with $q \in (\hat{q},\hat{q}\lambda]$ are made worse off since they have a negative consumer surplus: $b\text{-}p\text{-}q < 0$. The average consumer surplus of contacts given inaccurate information by dishonest brokers is

$$\int_0^{\hat{q}\lambda} (b-p-q)dF = \int_0^{\hat{q}\lambda} [b-\tfrac{1}{2}(b+c)-q]dF = \lambda(2-\lambda)\frac{(b-c)^2}{8Q} = \lambda(2-\lambda)U_1(p^k;b), \tag{43}$$

where $U_I(p^k;b)$ is the expected consumer surplus of contacts who receive accurate information (see equation (16)).

As Figure 7 indicates, contacts may be better off, on average, being contacted by a dishonest broker than remaining uninformed and not buying the product. In Figure 7, the expected consumer surplus of contacts who have a positive surplus is (1/Q) times the shaded area, and the expected negative surplus of those who are misled into a mistaken purchase is (1/Q) times the stippled area. Provided that $\lambda < 2$, the expected consumer surplus of contacts is positive. Thus, even though the commission system results in an inefficiently high price for the product and gives brokers an incentive to lie to their contacts, it is not necessarily true that contacts are worse off than the noncontacts who do not buy the product.

The welfare function under the commission system when there is misrepresentation is (remembering that noncontacts do not buy)

$$S = n\lambda(2-\lambda)U_1(p;b) = (p-c)nF(\hat{q}\lambda) - nK - \int_0^n w(\tilde{n})d\tilde{n}. \tag{44}$$

The marginal social value of a broker at the commission equilibrium is

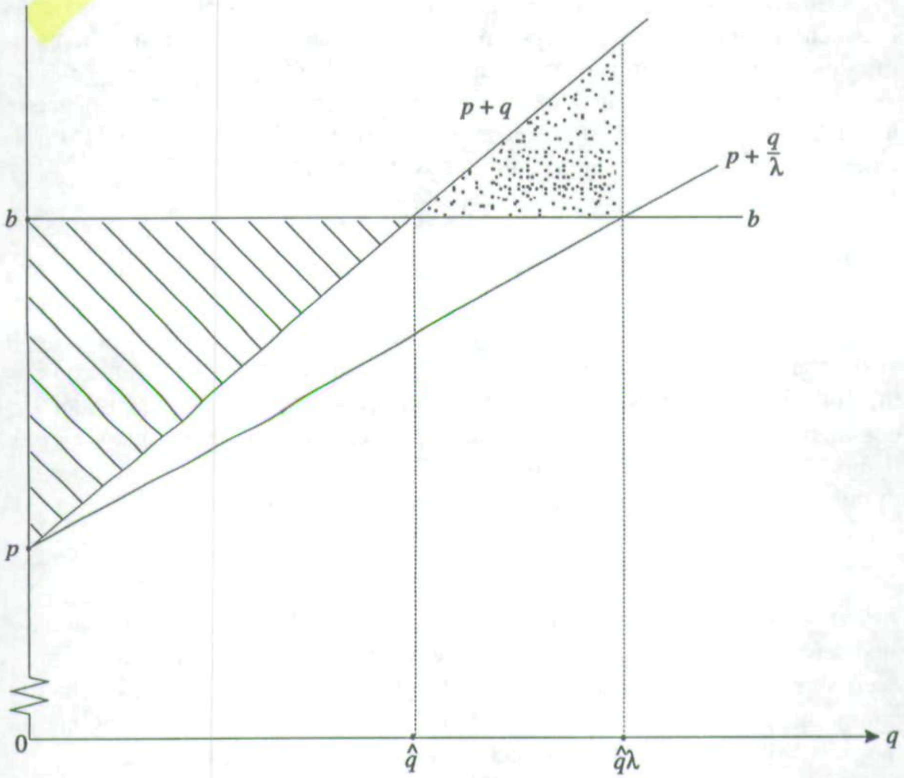
$$S_n = \lambda(2\text{-}\lambda)U_I(p^k;b) - nK'. \tag{45}$$

Provided that brokers do not lie to such an extent that their contacts would be better off not buying the product (i.e., provided $\lambda < 2$), the equilibrium may have too many or too few brokers. The *ceteris paribus* welfare effect of an increase in the price of the product is

$$S_p = -n(b\text{-}p\text{-}\hat{q})f\lambda - nF - n(p\text{-}c)f\lambda + nF = -n\lambda(2\text{-}\lambda)(b\text{-}c)f. \tag{46}$$

[28] With a uniform distribution the maximand is $k(b\text{-}c\text{-}k)\lambda/Q$, and the optimal k is independent of λ. If the distribution is not uniform, the optimal commission and price may be larger or smaller than they are with honest brokers.

Figure 7
Effect of Misleading Advice



When brokers mislead their contacts, it is possible that, on average, contacts would be better off not buying the product. In these circumstances, a price increase would be welfare increasing since it reduces the probability of purchase. Provided that $\lambda < 2$, the efficiency properties of the commission system are similar to those in which the brokers do not lie. It would be possible to improve on the efficiency of the resource allocation by suitable taxes or subsidies.

The concern in this article is the relative efficiency of the commission and fee regimes. The assumption on the distribution of mismatch costs ensures that misrepresentation does not affect the product price and commission, thus simplifying the comparison of the commission and fee regimes. Misrepresentation increases the expected income of brokers and reduces the expected consumer surplus of contacts under the commission system. Hence, as a glance at Figure 3 confirms, the value of the gross benefit parameter b^r at which brokers are indifferent between the two regimes is reduced. Since the expected consumer surplus of contacts under the commission regime is reduced by misrepresentation, the value of the gross benefit parameter b^u, at which the expected consumer surplus is the same under the commission and fee regimes, is also reduced. Although both b^r and b^u fall as λ increases, we can show that $c+\frac{1}{2}Q < b^u < b^r$ for all $\lambda \in [1,2)$.[29] Hence,

Proposition 8. For $\lambda \in (1,2)$, the qualitative results of the welfare comparisons between commission and fee systems are unaffected by the fact that the commission system leads to misrepresentation by brokers.

A value of $\lambda > 2$ implies that the consumer surplus of contacts is negative under the commission regime. Hence, if w' = 0, so that entry by brokers dissipates all rent, the commission regime is worse than the fee regime:

$$S^k = nk(\lambda(2\text{-}\lambda)U_I(p^k;b) < 0 = S^a. \tag{47}$$

When $\lambda > 2$, the expected revenue of brokers is greater under the commission regime than the fee regime for all values of the gross benefit parameter (see Table 2 and equation (42)). When w' > 0, the total rent of brokers will also be greater under the commission regime than under the fee regime and so the sum of consumer surpluses and broker rents may also greater under the commission regime at all levels of the gross benefit parameter. Again, we see that the fact that advice quality is worse under the commission system does not imply that welfare is smaller than under the fee system.

Conclusions

This article has shown that the method by which advice-givers are remunerated has significant implications for the well being of potential consumers, even when it is assumed that the quality of advice is unaffected. Regulatory policy must also take into account the effects of the remuneration regime on the prices of advice and the product, as well as on the quality of advice.

Intuition suggests that, when advice and the product are sold separately, welfare would be higher than when the reward to advice-givers is included in the product price. Potential consumers gain from advice even if they do not buy the product when informed. Thus, it might seem that it would be better to have a system in which the price of the product is determined solely by the costs of the product, rather than also reflecting the costs of advice. Once consumers are informed, their decision to purchase should not be influenced by the bygone costs of providing them with information.

This type of argument is incomplete. It neglects the fact that consumers will not become informed under a fee-for-advice system unless they first pay the fee. The fee set by brokers will reflect the weak market position of consumers and will accordingly exceed the second-best efficient level. Too few potential consumers become informed under the fee regime. On the other hand, too few

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[29] Choose units so that Q = 1, define b-c = x, and solve for the x^u at which $\lambda(2\text{-}\lambda)U_I(p^k;b) = U_G(c;b)$ as $[4\text{-}2\sqrt{(2-\lambda)2+2\lambda}]/\lambda(2\text{-}\lambda)$. Similarly, solve for the x^r at which $\lambda(b\text{-}c)^2/8Q = r^a$ as $x^r = (2\text{-}\sqrt{2\lambda})/(2\text{-}\lambda)$. Define $z(\lambda) = (x^u - x^r)\lambda(2\text{-}\lambda)$, which has the same sign as $x^u\text{-}x^r$ for $\lambda \in [1,2)$. Using *Eureka: The Solver* to graph $z(\lambda)$ shows that it is negative for $\lambda \in [1,2)$.

informed contacts buy the product under the commission regime because its price exceeds marginal cost.

Welfare comparisons require rather detailed specification of consumers' utility functions and broker supply functions. In those cases in which it is possible to reach definite conclusions, it appears that the greater the gross benefit consumers receive from the product, the more likely it is that a fee-for-advice system will yield a greater welfare. The reason is that consumers with high gross benefits are more likely to buy the product even if not given information about its characteristics. This reduces the value of advice to them and thus the ability of brokers to charge a high fee. Under a commission system, however, the presence of consumers with high gross benefits would lead to a high product price. The method of remunerating advice-givers will also have distributional implications in that consumers with high gross benefits will be better off under a fee regime, and those with low gross benefits will prefer the commission system.

The distribution of types of potential consumers influences the price of the product under the commission regime and the price of advice under the fee regime. The different types exert pecuniary external effects on each other. Under the commission system, an increase in B raises the product price but increases the brokers' revenue and thus the number of brokers. Potential contacts will have smaller surplus if contacted but have a greater chance of being contacted. Contacts with a small b may find that they no longer wish to buy at the higher product price and are made worse off. Contacts who continue to buy could be made better off if the supply elasticity of brokers is sufficiently large.

Under a fee regime, the implications of an increase in B are more complicated because the price of advice and brokers' expected revenue from selling advice could increase or decrease with B. If the price of advice increases with B, a potential type b consumer has a greater chance of being contacted but would have to pay more for advice. Some contacts with small b may now decide not to buy advice and are made worse off. Others may be better off because of the increased chance of becoming informed. If the increase in B reduces the price of advice, then some contacts with small b who would not previously have bought advice will be made better off.

If the commission system results in poorer quality advice than the fee system, there is still no presumption that a fee system is preferable. Although the quality of advice is poorer under the commission system, its price is lower and consumers may be better off on balance even though some of them will make mistaken purchases.

Appendix

Revenue Maximizing Advice Fee

The demand for advice is

$$D(\alpha) = D_1(\alpha) + D_2(\alpha) = [H(c+\tfrac{1}{2}Q) - H(b^-)] + [H(b^+) - H(c+\tfrac{1}{2}Q)],$$

where b^- and b^+ are given in Table 3. Consider the following partition of B:
(a) $B \in (c, c+\tfrac{1}{2}Q]$. Here $b^+ = B$, so $r = \alpha[H(B) - H(b^-)] = \alpha[B-c-\sqrt{\alpha 2Q}\,]/B$ is maximized at $\alpha^* = 2(B-c)^2/9Q$.
(b) $B \in (c+\tfrac{1}{2}Q, c+\tfrac{3}{4}Q)$. The marginal revenue function $r'(\alpha)$ is discontinuous at the fee $\hat{\alpha}(B) = (c+Q-B)^2/2Q$, where $b^+ = c+Q-\sqrt{\hat{\alpha}2Q} = B$. Marginal revenue is

$$\begin{aligned} r'(\alpha) &= \alpha D_1' + [D_1 + D_2] = \frac{1}{B}[B-c-\frac{3}{2}\sqrt{\alpha 2Q} = r_-', \ (\alpha<\hat{\alpha},\ b^+>B) \\ &= \alpha[D_1' + D_2'] + [D_1 + D_2] = \frac{1}{B}[Q-3\sqrt{\alpha 2Q}\,] = r_+', \ (\alpha>\hat{\alpha},\ b^+<B). \end{aligned}$$

Note that $\hat{\alpha}$ is decreasing in B. There are three possible solution types depending on B, and, over this range of B, all three occur.
(i) $\alpha^* < \hat{\alpha}$. Setting $r'_-(\alpha) = 0$ and solving gives $\alpha^* = 2(B-c)^2/9Q < \hat{\alpha}(B)$. α^* is increasing in B and $\hat{\alpha}$ is decreasing so that the largest value of B at which this type of solution holds is $B_1 = c + \tfrac{3}{5}Q$, found by solving $r'_-(\hat{\alpha}(B_1)) = 0$.
(ii) $\alpha^* = \hat{\alpha} = (c+Q-B)^2/2Q$ so that $r'_-(\hat{\alpha}(B)) > 0 > r'_+(\hat{\alpha}(B))$. $\hat{\alpha}$ is decreasing in B, and $r'_+(\alpha)$ is decreasing in α, so that this type of solution holds for $B \in (B_1, B_2)$, where $B_2 = c+\tfrac{2}{3}Q$ is found by solving $r'_+(\hat{\alpha}(B_2)) = 0$.
(iii) $\alpha > \hat{\alpha}$. Setting $r'_+(\alpha) = 0$ and solving gives $\alpha^* = Q/18$. This solution type holds for $B \geq B_2 = c+\tfrac{2}{3}Q$.

Expected Consumer Surplus of Contacts

Under the fee system, the expected consumer surplus of a contact is

$$\begin{aligned} CS^a &= \int_{b^-}^{b^+} [U_I(c;b)-\alpha]dH + \int_{b^+}^{B} U_G(c:b)dH \\ &= \left[\frac{(b^+-c)^3}{6QB} - \frac{(b^- c)^3}{6QB}\right] - r^a - \left[\frac{(B-c-\tfrac{1}{2}Q)^2}{2B} - \frac{(b^+-c-\tfrac{1}{2}Q)^2}{2B}\right], \end{aligned}$$

and the consumer surplus of contacts under the commission system is $CS^k = V_I(p^k;B) = 4(B-c)^3/81QB$. r^a is given in Table 3, as is α, which is required to calculate b^+ and b^-. There are four cases:
(a) $B \in (c,c+\tfrac{1}{2}Q]$. Here, $b^+ = B$, $b^- = c+\tfrac{2}{3}(B-c)$, the last term in CS^a is zero, and

$$CS^a - CS^k = (B-c)^3[1-\frac{8}{27}-\frac{4}{9}-\frac{8}{27}]/6QB < 0.$$

(b) $B \in [c+\tfrac{1}{2}Q, c + \tfrac{3}{5}Q$. Here, again, $b^+ = B$, $b^- = c+\tfrac{2}{3}(B-c)$, the last term in CS^a is zero, and the previous result holds.

(c) $B \in [c + \frac{3}{5}Q, c+\frac{2}{3}Q]$. Here, $b^+ = B$, the last term in CS^a is zero, but now $b^- = c + (c+Q-B)$ and so

$$CS^a - CS^k = \frac{1}{6QB}\{(B-c)^3 - (c+Q-B)^3 - (c+Q-B)^2[2(B-c)-Q] - \frac{8}{27}(B-c)^3\}.$$

This expression has a positive derivative with respect to B over this range, is negative at $c+\frac{3}{4}Q$ and positive at $c+\frac{2}{3}Q$. To find B^I at which CS^a-$CS^k = 0$, define $x = B-c$, choose units so that $Q = 1$, and solve the cubic equation

$$x^3 - (1-x)^3 - 3(1-x)^2(2x-1) - \frac{8}{27}x^3 = 0.$$

The three roots were obtained using *Eureka: The Solver* as 0.43708968, 0.60997349, 1.7460403, and so B^I is approximately 0.61.

(d) $B \in (c+\frac{2}{3}Q, c+Q)$. Now $b^+ = c+\frac{2}{3}Q$, and so the last term in CS^a is positive as some contacts refuse to buy advice but buy the product direct. Since $b^- = c+\frac{1}{3}Q$,

$$CS^a - CS^k = \frac{8Q^3 - Q^3}{162QB} + \frac{(B-c-Q)^2 - \frac{1}{36}Q^2}{2B} - \frac{Q^2}{54B} - \frac{4(B-c)^3}{81QB},$$

which is positive at $B = c+\frac{2}{3}Q$ and increasing with B.

Effect of Systems on Different Types

A type b potential consumer has probability n^i/N of being contacted under system i and so has expected consumer surplus of

$$U^k(p^k;b) = [(N-n^k)U_G(p^k;b) + n^kU_I(p^k;b)]/N = n^kU_I(p^k;b)/N$$

under the commission system (since he never buys if not contacted). Under the fee-for-advice system, he gets

$$U^a(c;b) = \begin{cases} 0 & \text{if } b \le b^- \\ [(N-n^a)U_G(c;b) + n^a[U_I(c;b)-\alpha]]/N & \text{if } b \in [b^-, b^+ \\ U_G(c;b) & \text{if } b \ge b^+ \end{cases}$$

Since p^k and α (and thus b^-, b^+) depend on B, so will the sign of $\Delta(b;B) = U^a - U^k$ for given b. Using Table 3 and equation (32), we see that, for all B, $p^k < b^-$. Hence, for $B \in (c, c+\frac{3}{4}Q)$, we have $\Delta(b;B) < 0$ for $b \in (p^k, b^-]$. In the text, it was asserted that Δ changes sign once over the interval (b^-, B). Since $\Delta(b;B)$ is quadratic in b for $b \in [b^-, B]$, we prove the text proposition by establishing that $\Delta(B;B) > 0$ for all $B \in (c, c+\frac{3}{4}Q)$.

(a) $B \in (c, c + \frac{3}{5}Q]$. Over this range, $b^+ = B$; $r^a = r^k$, and so $n^a = n^k$. Now

$$U_I(c;B) - \alpha = \frac{1}{2Q}(B-c)^2 - \frac{2}{9Q}(B-c)^2 > U_I(p^k;B) = \frac{4}{81Q}(B-c)^2,$$

and, hence, an individual contact with $b = B$ does better under the fee system. Since $U_G(c;B) \geq 0$, we have $\Delta(B;B) > 0$.

(b) $B \in (c + \frac{3}{5}Q, c+\frac{2}{3}Q]$. We have $U^a(c;B) > U_G(c;B) = B\text{-}c\text{-}\frac{1}{2}Q$ and $U_I(p^k;B) = \frac{2}{9}Q\ (B\text{-}c)^2$ and $U_G(c;B) - U_I(p^k;B)$ is positive at $B = c + \frac{3}{5}Q$ and increasing with B over this range. Hence, $\Delta(B;B) > 0$.

(c) $B \in (c+\frac{2}{3}Q, c+\frac{3}{4}Q)$. Here $b^+ < B$, and so $U^a(c;B) = U_G(c;B) = B\text{-}c\text{-}\frac{1}{2}Q$. Now $U_G(c;B) - U_I(p^k;B)$ is positive at $B = c+\frac{2}{3}Q$ and increasing with B over this range. Hence, $\Delta(B;B) > 0$ for all B in this range.

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