Transpn Res.-A Vol. 17A, No. 1, pp. 25–31, 1983
Printed in Great Britain.

0191-2607/83/010025–07$03.00/0
Pergamon Press Ltd.

THE ECONOMICS OF CHEATING IN THE TAXI MARKET†

AMIHAI GLAZER
School of Social Sciences, University of California, Irvine, CA 92717, U.S.A.

and

REFAEL HASSIN
Department of Statistics, Tel Aviv University, Tel Aviv, Israel

(*Received* 11 *March* 1982, *in revised form* 28 *April* 1982)

Abstract—Because taxi fares usually increase with the length of the ride and because many passengers are ignorant of which is the most direct route to their destinations, taxicab operators have an incentive to cheat their customers by taking circuitous routes. In this paper we provide a theoretical analysis of such cheating. We find that a monopolist will cheat its customers more than would a competitive firm: that an increase in the number of taxicabs will increase the extent of cheating: and that in the absence of a certain form of nonlinear pricing, operators will either cheat some customers or refuse to serve others.

1. INTRODUCTION

In most cities the fare for a taxicab ride is an increasing function of the length of the trip, so that a taxicab operator can increase his profits by taking a circuitous route to the passenger's destination, instead of taking the most direct one. Although no reliable data exist concerning the extent of such cheating, this phenomenon is not only a theoretical possibility: in twelve trips between the Los Angeles airport and downtown Los Angeles, an investigating reporter for the *Los Angeles Times* was cheated seven times. Drivers taking indirect routes added as much as $5.60 (that is, 43%) to the cost of a ride (see *Los Angeles Times* 1979).

This type of overcharging is, of course, present in other markets as well (such as those for the services of physicians, lawyers, plumbers, or automobile repairmen). But the taxicab market possesses several distinguishing features which make it particularly appropriate for study. First, because few passengers are likely to encounter the same driver more than once and because many passengers are visitors who will leave the city soon after obtaining service, the prospect of repeat patronage is remote; a taxicab operator who cheats his customers loses little future business by doing so. This feature distinguishes the present analysis from that given by Darby and Karni (1975) in their seminal paper. The latter authors see each firm as choosing a price that will maximize the value of current profits plus the anticipated present value of future profits obtained from services to a given customer. In contrast, our analysis focuses on the relationship between different price structures and a firm's incentive to serve many customers quickly and honestly, instead of spending that same time defrauding a few unfortunate consumers.

Second, cheating in the taxicab market usually takes the form of providing overly long rides; it is a rare passenger who is delivered short of his destination. (Nevertheless, taxicab operators may simply refuse to serve some passengers, an issue we deal with below.) Finally, a passenger obtains no benefit whatsoever from a ride which is longer than necessary. All this stands in marked contrast to the medical market, for example, in which the client relationship plays an important role, and where the benefit obtained by the customer is usually an increasing function of the amount of service provided.

By considering these special features of the taxicab market, we are able to offer a reasonably simple model of a market in which cheating occurs. Our assumptions are set forth in Section 2. In Section 3 we consider the case in which all consumers are identical; this model is generalized in Section 4. In section 5 we determine the characteristics of a fare structure that makes cheating unprofitable. Concluding comments are offered in the final Section.

2. FRAMEWORK

As mentioned above, this paper determines the relation between the fare structure (which is taken to be exogenously set), and the degree of cheating in the taxicab market. In providing a ride of duration t, the operator earns a revenue of $h(t)$ dollars. We treat $h(t)$ as being given exogenously, but it is useful to discuss the forms it may take. Fares in the taxicab industry are usually set by a governmental agency. Most of the fares consist of a fixed charge, F, plus a variable charge (of say, p) for each minute or mile the passenger is served. Thus, the regulated fare is roughly $F+pt$. But the driver also faces the risk that a passenger refuses to pay the fare, or that, believing he has been cheated, the passenger imposes monetary and non-monetary costs on the driver. Thus, $h(t)=F+pt$, plus some other, generally nonlinear, term.

Let $c(t)$ be the variable cost of providing service, so that the driver's net revenue in serving a passenger for t minutes is $g(t)=h(t)-c(t)$. Such a function is shown as

†The research reported in this work was supported by the Institute of Transportation Studies at the University of California, Irvine. Helpful suggestions were provided by Charles Lave, Pete Fielding, and an anonymous referee.

curve GG in quadrant *I* of Figure 1. The only assumption made about $g(t)$ is that it be an increasing function of t for at least some values of t. If $g(t)$ is not everywhere concave, we need consider only its convex hull. Thus, in Fig. 2, if $g(t)$ is given by the solid curve, the curve relevant for our purposes is the one depicted with broken segments. For convenience, this latter curve is referred to as $g(t)$.

Taxicabs operate in the following manner. A driver picks up a passenger and serves him for, say, t minutes, thereby earning a net revenue of $g(t)$ dollars from that customer. The driver must search for a new passenger upon the completion of each ride. The driver does not know precisely how long he will have to wait until he finds a new customer; but he does know that the expected length of time spent searching for a new customer is w minutes. The operator earns no revenue and incurs no expenses during a period in which the taxi is unoccupied.

The taxicab operator's objective is to maximize profits, that is, to maximize his total net revenue for the period under consideration, or, equivalently, to maximize average net revenue. In serving any N passengers the driver earns a profit of $Ng(t)$ dollars, and spends an average of $N(w+t)$ minutes waiting and driving. Thus, the driver's average net revenue is $g(t)/(w+t)$, and he wishes to maximize this function given his control over t. Maximization requires that marginal net revenue equal average net revenue.† Thus, in Fig. 1, if $w = w_1$, the optimal value of t is t_1. Average net revenue is given by the slope of line w_1w_1, which equals marginal net revenue as given by the slope of curve GG at point *C*.

There is no reason to suppose that this value, t_1, represents the minimum time required to serve a passenger. It may well be that the same distance could be covered in only t^* minutes (where $t^* < t_1$). The value of $t_1 - t^*$ represents the extent of cheating practiced in the market.

The equilibrium duration of a ride depends on w, a driver's expected waiting time for a passenger. In a market in which there are many taxis, no one driver can affect the value of w observed in that market. Yet w itself is a function of the lengths of rides offered. Recall that to each value of t there corresponds a price for the

†Analytically, a driver's problem is to maximize $g(t)/(w+t)$ where w is treated as a parameter by any one driver. A necessary condition for an optimum is that $g'(t) = g(t)/(w+t)$.

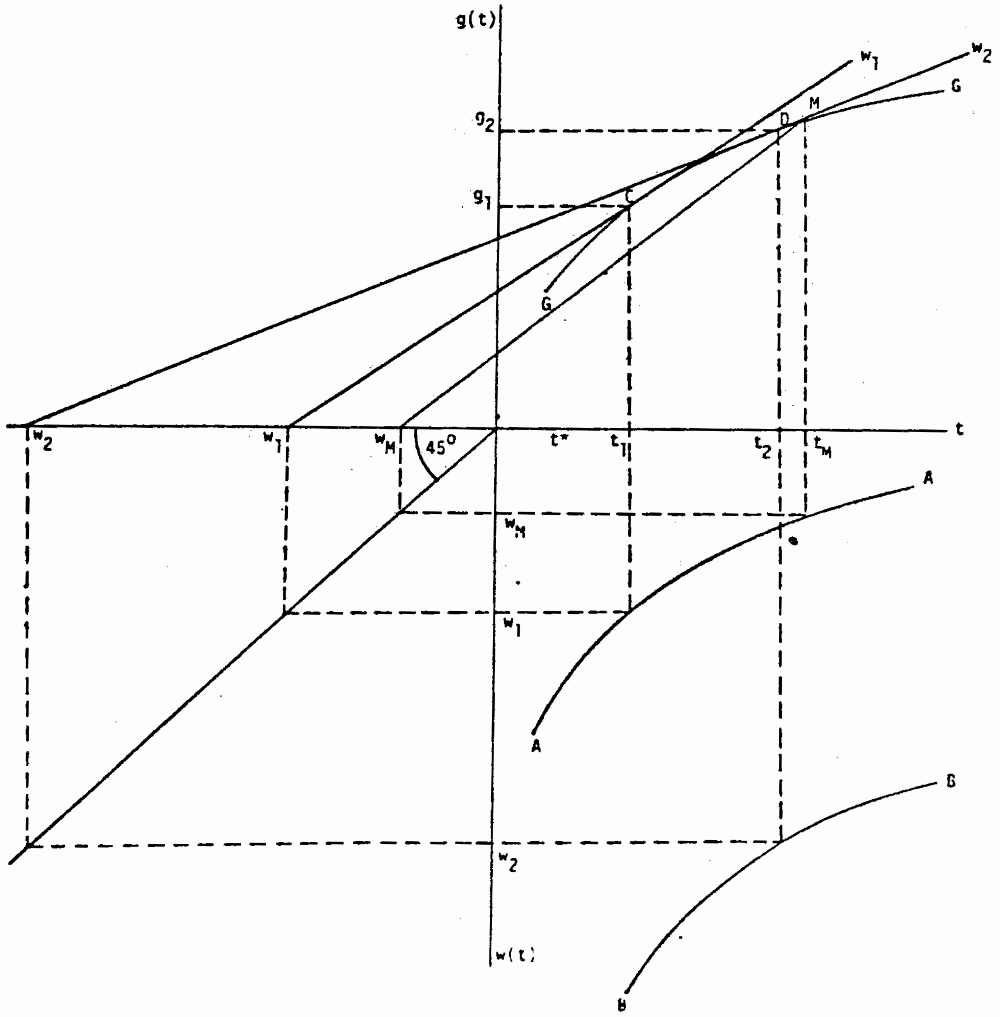

Fig. 1.

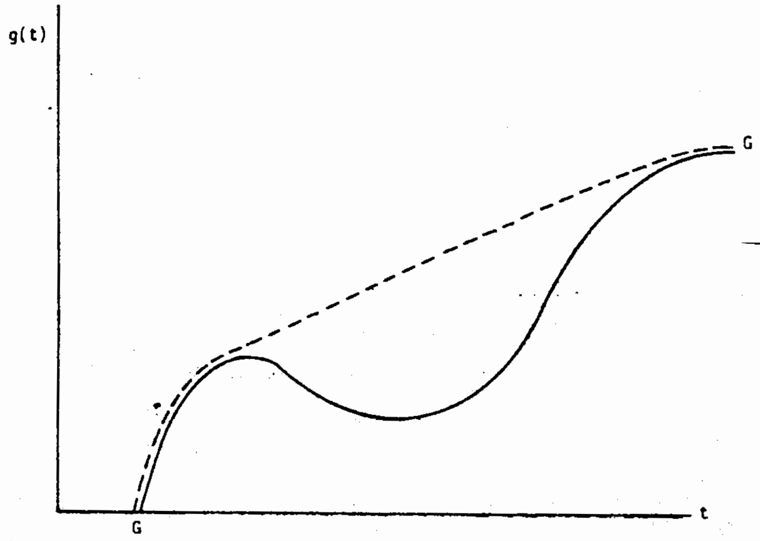

Fig. 2.

ride, $h(t)$. Consumers' demand for taxi rides is, of course, a function of this price, of the expected duration of a ride (*ceteris paribus*, consumers' demand for taxicab service is greater the more quickly a passenger is delivered to his destination), and of the expected length of time a consumer must wait until he is served. But a consumer's expected waiting time is, in turn, a function of the total number of consumers who desire service; the greater the number of passengers served, the longer each consumer must wait for service. Thus, consumer demand, which we denote by D, can be given by the function $D = f[D, h(t), t]$. But this means that holding constant consumer income and the prices of all other goods, D is a function of t alone, say $D = D(t)$.

We can now turn to a discussion of drivers' waiting times. For any fixed number of taxis, each driver's waiting time is a function of the number of passengers who wish to be served and of the average length of a ride; the greater the demand for rides, or the longer the duration of a typical ride, the shorter the expected length of time each driver must wait to find a new passenger. We can therefore write $w = w[D(t), t] = w(t)$.

Thus, it is evident that a driver's expected waiting time is a function of the length of rides. Note that the form of the function $w(t)$ reflects the effects of two important features of the market: that the demand for rides is a function of a passenger's expected waiting time and of the amount of cheating practiced in the market.

It is impossible to determine on *a priori* grounds whether $w(t)$ is an increasing or a decreasing function of t. An increase in t has two opposing effects. On the one hand, it should decrease the number of consumers who demand service, and thereby increase w. On the other hand, the longer each passenger is served, the fewer the number of taxicabs that are unoccupied, and therefore the lower the value of w. Because the analysis is very similar for the cases in which w is a decreasing and an increasing function of t, in the interests of brevity we consider only the former case. Two such functions are shown as curves AA and BB in the fourth quadrant of Fig. 1.

With the aid of the 45° line shown in quadrant III of Fig. 1, we can put the apparatus to work, and determine the equilibrium levels of the duration of a ride, the price of a ride, and a taxicab's waiting time.

3. EQUILIBRIUM IN A SIMPLE MODEL

Two equilibria are depicted in Fig. 1, at points C and D. We examine first the former one (and ignore for the moment curve BB). When $t = t_1$ we read from curve AA that $w(t_1) = w_1$. Given that $w = w_1$, each driver maximizes average net revenue by setting $t = t_1$. At this equilibrium, the net revenue obtained from each customer is $g_1 = g(t_1)$, average net revenue equals $g_1/(t_1 + w_1)$, and line w_1w_1 is tangent to curve GG at point C.

Suppose next that the function $w(t)$ changes in any manner whatsoever with the effect of increasing a driver's expected waiting time for any given value of t. In quadrant IV of Fig. 1 this is depicted by a shift in the function $w(t)$ from curve AA to curve BB. If curve GG is concave, then such a shift necessarily leads to an increase in the equilibrium value of t. In our case, given curve BB rather than AA, the new equilibrium value of t is t_2, w equals w_2, the net revenue obtained from each customer has increased from g_1 to g_2, and a driver's average revenue has decreased from that given by the slope of line w_1w_1 to that given by the slope of line w_2w_2.

Two applications of this result may prove useful. Suppose that in the initial equilibrium $t = t_1$. If the number of taxicabs is increased, then we would expect that for any given value of t each driver's waiting time increases; that is curve AA shifts down to curve BB. In this new equilibrium the value of t has increased from t_1 to t_2. An increase in the supply of taxicabs has resulted in an increase in cheating.

As another application, suppose there is an exogenous increase in the demand for rides (which may be caused, for example, by a bus strike). This has the effect of shifting a curve such as BB upwards and to the left. In the new equilibrium, the value of t will have decreased and the extent of cheating will have diminished.

These effects have been ignored in the literature (see, for example, Abe and Brush (1976), Coffman (1977), De Vany (1975), Douglas (1972), Manski and Wright (1976), Orr (1969) and Schreiber (1977)). Virtually all of this literature on the taxicab industry focuses on one aspect of the market: consumers' demand for service, and the utility they derive therefrom, is a function not only of the price of a ride, but also of the length of time a consumer must wait for service.

The authors of these articles therefore agree that excess capacity does not necessarily reduce the level of social welfare; for the lower the utilization rate of taxis, the less time consumers have to spend waiting for service. But this view is misleading: it ignores the possibility that drivers cheat their passengers. Because a driver can serve each passenger for an unduly long time, and will wish to do so when passengers are hard to find, an increase in the number of taxis has the effect of increasing both the average length of a ride and the fare that passengers pay; the increase in capacity may have little effect on the availability of taxis.

So far we have analyzed the equilibrium solution in an atomistic market in which the behavior of any one driver does not affect the behavior of other drivers or consumers. We can, however, also determine the profit maximizing level of t that would be chosen by a monopolist.

Suppose that a fixed number of taxis are operated by one firm; that is, management can instruct each driver on the length of time, t_j he should serve each passenger. As before, assume that the net revenue function, $g(t)$, is exogenously fixed, and that the firm's objective is to maximize total revenue; but once again this objective is identical to the maximization of the revenue earned each minute a taxi is in operation. The monopolist will choose that value of t that maximizes $g(t)/(w(t)+t)$; but whereas an operator in a competitive market views w as fixed, the monopolist recognizes that w is a function of t.

A monopolist's optimal solution is shown by point M in Fig. 1.† Each passenger is served for t_M minutes, each driver waits an average of w_M minutes until he finds a new passenger; the average revenue earned per minute is given by the slope of line $w_M M$, which we note, is steeper than the slope of line $w_1 w_1$ representing average net revenue in a competitive market.

In this example, the monopolist serves each passenger for a longer period than would a driver who individually maximizes revenue. This result is generally true if the curves depicting $g(t)$ and $w(t)$ are upward sloping.‡ Cheating may be a more serious problem in a monopolistic than in a competitive market.

†Analytically, the monopolist's objective is to maximize $g(t)/(w(t)+t)$. A necessary condition for a maximum is that $g(t)/(w(t)+t) = g'(t)/(w'(t)+1)$.

‡Proof: Let $S=[g(t)]/[w(t)+t]$. We wish to evaluate $(ds)/(dt)$ at point t_1 of Fig. 1. $(ds)/(dt) = [[w(t)+t)g'(t) - g(t)[w'(t)+1]]/[[w(t)+t]^2]$, and therefore $(ds)/(dt)>0$ if $[w(t)+t]g'(t) > g(t)[w'(t)+1]$. But at point t_1, $(g(t))/(w(t)+t) = g'(t)$, so that at point, t, $(ds)/(dt)>0$ if $w'(t_1)<0$. That is, the monopolist can increase his profits by choosing a value of t which is greater than the equilibrium value of t, t_1, in a competitive market. QED.

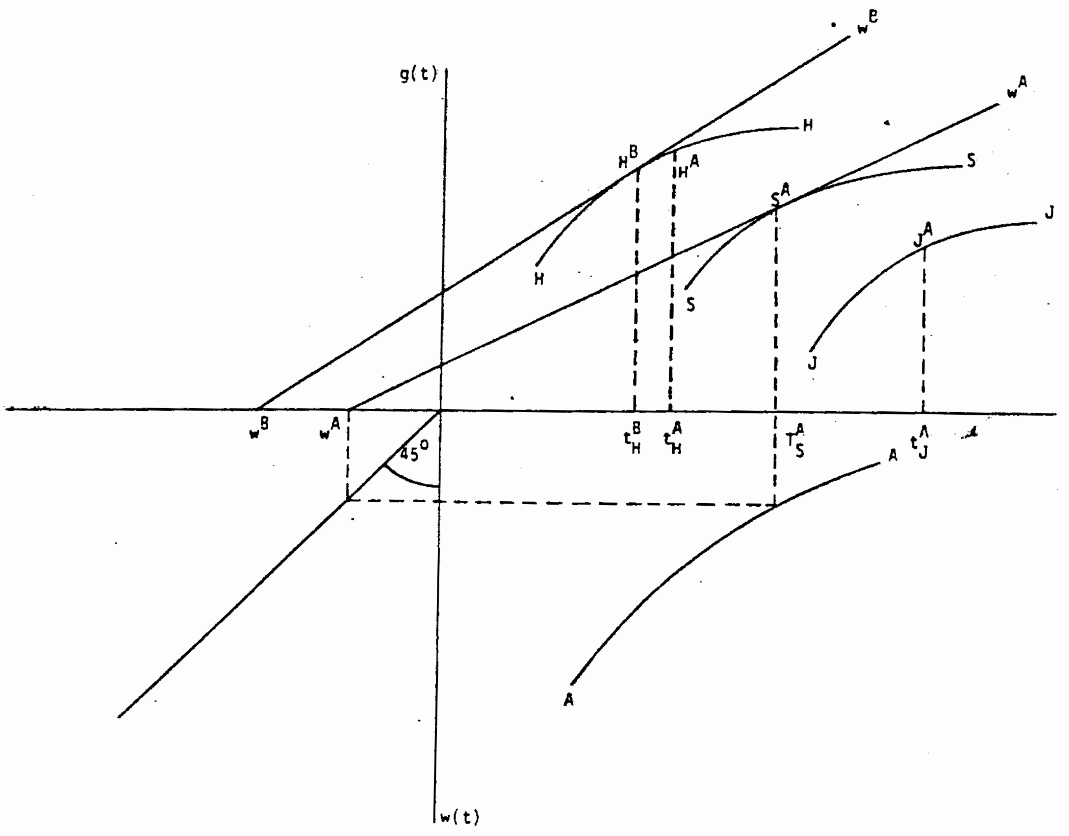

Fig. 3.

4. TWO CLASSES OF CONSUMERS

The previous section examined the equilibrium amount of cheating for the case in which all consumers are identical. More generally, however, different consumers wish to be transported to different locations. One passenger's destination may be a slum a mile away, where the driver may be mugged, while another passenger wishes to be driven to a suburb at a distance of twenty miles.

The net revenue, $g(t)$, obtainable from these two passengers may then well differ, in which case several interesting questions arise. How long is each customer served? Are *all* passengers served or does a driver find it profitable to refuse service to some customers and instead to wait for some other passengers? What is the effect of an increase in the fare for one class of customers on the quantity of service provided other customers?

We suppose that the population of potential passengers is equally divided between the two classes. The net revenue obtainable from each type-H consumer is shown by curve HH in Fig. 3, and the net revenue obtainable from type-J consumers is shown by curve JJ. A driver need not, of course, treat these two types of consumers identically; let t_H be the length of rides provided type-H consumers, and let t_J be the corresponding value for type-*J* consumers.

The first topic we address are the values of t_H and t_J chosen by a driver when both classes of consumers must be served. The problem is easily solved by considering it in two stages: first the optimal choice of $T=\frac{1}{2}t_H+\frac{1}{2}t_J$ (i.e. the average time a passenger is served), and second, the optimal choices of t_H and t_J subject to the constraint that $\frac{1}{2}(t_H+t_J)=T$.

Consider first the latter problem. It is clear that for any value of T, the values of t_H and t_J must satisfy the condition that the added revenue obtainable from serving a customer for an additional unit of time be equal for all customers, or that $g_H'(t_H)=g_J'(t_J)$.† Given this condition, and the identity that $T=\frac{1}{2}(t_H+t_J)$, we can find the optimal values of t_H and t_J for any given value of T. We can therefore also determine the value of $g(T)=1/2[g_H(t_H)+g_J(t_J)]$. This function $g(T)$, representing the taxicab operator's net revenue from providing rides whose average length is T minutes, is shown as Curve SS in Fig. 3. For example, when T equals T_S^A, the optimal value of t_H is t_H^A, and the optimal value of t_J is t_J^A; $g_H(t_H^A)$ is given by the length of segment $t_H^AH^A$, $g_J(t_J)$ is given by the length of segment $t_J^AJ^A$, the slopes of curves HH at point H^A, JJ at point J^A, and SS at point S^A are all equal, and $1/2(g_H(t_H)+g_J(t_J))$ equals the length of segment $T_S^AS^A$.

Once curve SS has been derived it can be used in the same manner that curve GG was used in Fig. 1. If the average duration of a ride is T minutes, then the average revenue that can be obtained from a passenger is $g(T)$, which can be read off from curve SS.

In addition to the time spent serving passengers, each driver also spends some time searching for passengers. A driver's average waiting time per customer, w, is a function of the average values of t_H and t_J observed in the marketplace. But since we know the values of t_H and t_J for any value of T, we can determine the function $w(T)$, which is shown by curve AA in quadrant IV of Fig. 3. Finally, as in the discussion of the simpler case, once the value of w is known, the driver's optimal strategy can be found from the point of tangency between the curve SS and a line originating at point $(-w, 0)$.

Under the assumption that both classes of consumers are served, an equilibrium is depicted in Fig. 3 by those points with superscripts *A*. The equilibrium value of w is w^A. The optimal value of t given this value of w is T_S^A, and at point S^A line w^Aw^A is tangent to curve SS. Each type-H passenger is served for t_H^A minutes, and each type-*J* passenger is served for t_J^A minutes. The driver's average net revenue is given by the slope of line w^Aw^A.

There is no reason to suppose, however, that a driver will wish to carry all passengers he may find. It may be worthwhile for any one driver to serve only type-*H* passengers. Suppose that initially all but one of the drivers serve both types of passengers, and that one driver serves only type-*H* passengers. As these type-*H* consumers constitute only half of the total number of consumers, the driver's average waiting time for a type-*H* consumer is $w^H=2w^A$. Given this value of w, the driver maximizes net revenue by serving each type-*H* customer he finds for t_H^B minutes; for at this value of t the line w^Bw^B is tangent to curve HH. Observe that the slope of line w^Bw^B is greater than the slope of line w^Aw^A, which means that this driver earns a larger average revenue than do drivers who serve all passengers.

Moreover, passengers may *prefer* to be served by a driver who serves only type-*H* consumers. Recall that the slope of curve HH at point H^A is equal to the slope of curve SS at point S^A. But if line w^Hw^H is steeper than line w^Aw^A, and curve HH is concave, then t_H^H must be less than t_H^A. In markets in which cheating (that is the provision of unnecessarily long rides) is a problem, consumers served by a driver who transports only type-*H* consumers will be cheated less than are other consumers. To summarize, a driver who does not serve all

†Let $g_H(t_H)$ be the revenue earned from a type-*H* consumer who is served t_H minutes, and let $g_J(t_J)$ be the corresponding function for a type-*J* consumer. The driver's objective is to maximize average revenue,

$$\frac{\frac{1}{2}g_H(t_H)+\frac{1}{2}g_J(t_J)}{w+\frac{1}{2}t_H+\frac{1}{2}t_J},$$

where the choice variables are t_J and t_H. The first order conditions for a maximum are:

$$\left(w+\frac{1}{2}t_H+\frac{1}{2}t_J\right)g_H'(t_H)=[g_H(t_H)+g_J(t_J)]\left(\frac{1}{2}\right),$$

and

$$\left(w+\frac{1}{2}t_H+\frac{1}{2}t_J\right)g_J'(t_J)=[g_H(t_H)+g_J(t_J)]\left(\frac{1}{2}\right),$$

from which it follows that at the optimum $g_J'(t_J)=g_H'(t_H)$.

classes of customers will earn greater profits and will charge a lower fare than will drivers who serve all consumers.† In equilibrium, it may well be that operators refuse to serve some classes of customers.

Finally, given the resemblance between curve SS of Fig. 3 and curve GG of Fig. 1, it is easy to see that all of the results obtained in Section 3 also apply to the case in which there exists more than one class of consumers: in general drivers will find it profitable to cheat their customers; an increase in the number of taxicabs in service will lead to more cheating, and may therefore have little effect on decreasing consumers' waiting time; cheating is likely to be a more serious problem in a monopolistic than in a competitive market.

5. CHEAT PROOF PRICES

The previous sections showed that the value of t chosen by the seller is determined by the fare structure, *i.e.*, by the form of $g(t)$. In this section we determine the nature of a price structure that induces drivers to serve all customers without cheating any one of them.

The nature of the problem is best illustrated by a simple example, although the results can be applied more generally. Let the population be equally divided between two types of consumers. Let the minimum amount of time required to transport each type-H and type-J customer be t_H minutes and t_J minutes respectively; we define cheating to occur whenever a passenger is served for a longer period than this required minimum. Let the taxicab operator receive p_J dollars for serving a customer for t_J minutes, and let him receive p_H dollars for serving a customer for t_H minutes. Although these fares are fixed, the operator determines the length of service he provides each customer; he may, for example, serve type-H customers for t_J minutes, where $t_J > t_H$.

Our first goal is to determine prices such that the driver will not find it profitable to cheat in such a manner. If the driver does not cheat, his average revenue is

$$\frac{p_H + p_J}{2w + t_H + t_J}. \tag{1}$$

If he does cheat, he serves each passenger for t_J minutes at a charge of p_J; the driver's average revenue would be

$$\frac{2p_J}{2w + 2t_J}. \tag{2}$$

The driver will not cheat type-H customers if

$$\frac{p_H + p_J}{2w + t_H + t_J} \geq \frac{2p_J}{2w + 2t_J}, \tag{3}$$

or

$$\frac{p_H}{p_J} \geq \frac{w + t_H}{w + t_J}. \tag{4}$$

As all that matters is relative prices, we can assume that p_J is fixed; it follows that the lowest value of p_H for which the driver will find no gain in cheating a type-H passenger is that for which

$$\frac{p_H}{p_J} = \frac{w + t_H}{w + t_J}. \tag{5}$$

But eqn (5) implies that, in general, the price structure must have the form $g(t) = pw + pt = F + pt$, where t is the length of a ride, p is the charge per minute of service, and F is a fixed charge.

This pricing structure has an additional attractive feature: it provides the driver with an incentive to serve a passenger regardless of the length of ride the passenger desires. To see this, recall that the average revenue earned by a driver who serves all customers (with no cheating) is given by eqn (1). If the driver serves only type-H customers his expected waiting time for a customer is $2w$, so that his average net revenue is

$$\frac{p_H}{2w + t_H}. \tag{6}$$

The driver will find it unprofitable to serve only type-H passengers if and only if

$$\frac{p_H}{2w + t_H} \leq \frac{p_H + p_J}{2w + t_H + t_J}. \tag{7}$$

Substituting $p_H = pw + pt_H$, and $p_J = pw + pt_J$ in expression (7), we obtain

$$\frac{p(w + t_H)}{2w + t_H} \leq \frac{p(2w + t_H + t_J)}{2w + t_H + t_J} = p. \tag{8}$$

But inequality (8) is always satisfied; given the prices specified drivers will not find it profitable to refuse service to some customers.

Notice that these prices, $F + pt$, are non-linear in the sense that

$$\frac{p_J}{p_H} < \frac{t_J}{t_H}.$$

We conclude that, apart from any considerations of price discrimination, the average price per mile of a long taxicab ride should be less than that of a short ride. The price of a ride should be proportional to the total time necessary to provide service, including the expected time a driver spends to find a passenger. In other words, cheat proof prices should consist of both a fixed charge and of a variable charge that is a function of the length of service provided.

The fixed charge, F, should be proportional to w. If $F < pw$ then, in general, a driver would find it profitable to

†In Fig. 3 we have a situation in which, in equilibrium, drivers will not wish to serve type-J consumers. Obviously, if curve JJ were shifted sufficiently upwards and to the left, we would find an equilibrium in which drivers would wish to serve all consumers.

serve few customers and to cheat those customers he does serve. If $F > pw$ the driver would find it profitable to refuse service to some passengers who require long rides, and would instead serve many customers each of whom he can transport in a short period. That is, any set of prices that differ from the ones specified above may cause drivers to cheat or else to refuse service to some groups of customers.

6. CONCLUSION

Regulation of the taxicab industry has traditionally consisted of two uncoordinated parts: the setting of fares at some remunerative level, and the use of administrative procedures to deal with problems of service quality. The usual response, for example, to complaints of inadequate service in some areas of the city is the institution of ineffective rules requiring taxicab operators to serve all customers; complaints of cheating by drivers may lead to the occasional levying of fines against the culprits.

We have argued, however, that these problems may arise simply because of the adoption of an improper fare structure. The use of a two-part tariff which reflects both the cost of transporting a passenger *and* the cost of finding him may prove effective in solving problems of the quality of service.

REFERENCES

Abe M. A. and Bruch. B. C. (1976) Regulation of price and service quality: the taxicab problem. *Quarterly Rev. Econ. and Business.* 16(3), 105–111.

Coffman R. B. (1977). The economic reasons for price and entry regulation of taxicabs: A comment. *J. Trans. Econ. and Policy* 11(3), 288–297.

Darby Michael R. and Karni E. (1973). Free competition and the optimal amount of fraud. *J. Law and Econ.*, 67–88.

DeVany A. S. (1975). Capacity utilization under alternative regulatory restraints: An analysis of taxi markets. *J. Political Econ.* 83(1), 83–94.

Douglas G. W. (1972). Price regulation and optimal service standards: The taxicab industry. *J. Trans. Econ. and Policy* 6(2), 116–127.

Los Angeles Times, Airport Taxi Ripoffs Common, June 20, 1979, Section I, p. 1.

Manski C. F. and Wright J. D. (1976). The nature of equilibrium in the market for taxi services. In *Innovations in Transportation System Planning: Transportation Research Record* No. 619. Transportation Research Board, Washington, D.C.

Orr D. (1969). The "taxicab problem": A proposed solution. *J. Political Econ.* 17(1), 141–147.

Schrieber C. (1977). The economic reasons for price and entry regulation of taxicabs. *J. Trans. Econ. and Policy* 11(3), 298–304.