Notes on Rosen: The Economics of Superstars

One characteristic of the entertainment industries is the relative concentration of revenues in a fairly small number of films, or stars. We have already seen that the distribution of revenues for movies is skewed to the right and we certainly have anecdotal evidence that the same is true for salaries of stars-that is, there are "superstars." In this paper Sherwin Rosen provides an economic explanation of the superstar phenomenon. This is not the only possible explanation, but it is useful to follow Rosen's logic as we attempt to understand the distribution of revenues in the entertainment industries.

Rosen's paper is aimed at other professional economists-it appeared in the American Economic Review, the journal of the American Economics Association. For this reason reading the paper can be pretty heavy sledding, which is the reason for this note. In this note I will point out the notation that Rosen uses and guide you the parts that contain the lessons I want you take away from this reading. **Before you begin, be assured that I do not expect you to follow the math in the paper. When the math gets heavy, just go to the words, they contain what you need to know.**

Section I

The main point of Section I is to describe how Rosen models consumer demand in these service markets. You have already seen utility functions for 2 goods, a and b written as:

$$u = u(a,b)$$

For Rosen good a is a composite of all goods other than the service he wants to examine. He calls that x and will later use it as the numeraire. You can think of x as money. His second good is a service flow $y = g(n,z)$. All this means is that the utility that a consumer gets from the service is a function of the quantity (n) and quantity (z) of the service. That is, if you like opera you get more jollies by either going to more operas or going to hear better singers or both. Now, this formulation is very general so on p. 848 he restricts the form of g(n,z) to be g(n,z)=zf(n), an indeed he goes even further and assumes that $y=g(n,z)=zf(n)=nz$. But, as he makes clear, this does not really limit the analysis.

Next Rosen introduces the concepts of "full price" and "full income" which you may not have seen before. These ideas come from Gary Becker and are simply the economists' way of saying that time is money. An example will show what I mean. Consider the price of an opera ticket. Imagine that a ticket to the opera costs $50. Further assume that the opera lasts for 1 hour; and you could have made $250 dollars during that hour (or gone to the beach which has a value of $250). Then the "full cost" of the opera ticket is $300-the $500 you paid and the opportunity cost of your time. All that equation (1) is doing is reflecting the budget constraint in terms of the other commodity consumed (at its full price of 1), and the amount of our service consumed at its full price of $\left[\frac{p+s}{z}\right]$.

z is "quality" so that at a given full price ($p+s$), higher quality means a lower price per unit of enjoyment.

Finally, Rosen gets to his equation 4. This simply captures the price a representative consumer will be willing to pay for a unit of service of quality z. Consumers will pay more for higher quality. But they will pay less (in dollar terms) when s is higher. The reason for this is that if the good in question is "opera" and we assume that the unit is "an opera" [not an "hour of opera"], then the longer the opera the more I am giving up in terms of how much money I could have made, or golf I could have played. Do not be confused by the fact that it looks like consumer's that make more will pay *less* for the opera [look at the top of the right column of p. 848 and see that $s=tw$ where w is the wage and t the time spend in the activity. The wage rate also shows up in the first term of equation 4.

By the way, remember that notation that if we have a function $u=u(x,y)$ then we write $\partial u / \partial x \equiv u_x$ for the partial derivative of u with respect to x.

All this section does is set up the demand side for services and what price consumers will pay for services of different quality. The point here is that consumers will pay more for higher quality services or will substitute quantity for quality. Use Rosen's doctor's office. A high quality doctor may make you pay by fee or by waiting and you may substitute a lower quality doctor who does not make your wait.

Also note that nothing Rosen has said so far really explains "superstars."

Section II

Here Rosen looks at the person who provides these services. Rosen's key intuition is developed in the first paragraphs of this section. Remember that a "pure public good" is a good that no consumer can appropriate. That is, I enjoy it and I cannot stop you from enjoying it also-my enjoying the good does not "consume" it and I can't make it my property so I can't exclude you. The math in the last full paragraph of page 849 simply makes clear the tradeoff for a producer. Think of q was what makes Nathan Lane better than me. I would have to do a hell of a lot of performances of *Guys and Dolls* to provide as much utility as Lane does from a single performance.

On the top of p. 850 Rosen introduces the distribution of talent, *f*. This is simply a way of saying that some people have more talent than others. He then points out that a talented person faces competition in two ways. First, there may be other people as talented as she. Second, she may perform so much (or in such large venues) that less talented people become substitutes at the given price. An average band in a bar on 3rd Street may be just as good as the Rolling Stones in the Coliseum. I know, I saw the Beatles live.

The bottom of the left column of page 850 simply lays out the individual talent's supply decision. Each performance has costs that vary with the number of people who attend (m). The price charged goes up with talent (Nathan Lane charges more per ticket than I do) but goes down with number of tickets sold (I won't pay as much for the Stones

in the Coliseum as I would for the Stones in a small club).[1] Note that Rosen points out the two ways of delivering patrons-larger venues or more performances. Note the use Rosen makes of what is often called a "participation condition" – in this case it is described in the first sentence following equation (7) [R>K] and simply says that if, at the profit maximizing point, the talent could make more money doing something else, they will. Of course, this should be interpreted loosely, the talent may derive pleasure from performing or form the perqs associated with being a performer -that is not captured in the money wage. For those not used to calculus, don't be bothered by the condition in equation (7), it is only the requirement that the second derivative must be negative in order to ensure that the extremum reached when the first derivative is set to 0 is, in fact, a maximum and not a minimum.

Section III

Here, at last, Rosen can get to the market equilibrium after he has covered the demand and supply sides.

Don't get hung up on the math in the first part of this section. The important result here in equation 12, which simply means that, after the smoke clears, more talented people make more money. Also, higher price leads to higher supply and lower demand so we have a "normal" market. This last point is made in the first half of the right column on page 651.

In the succeeding subsections Rosen teases out what can be learned from some special cases.

Section A.

Here Rosen simplifies things by assuming that the provider's quality does not deteriorate with quantity provided. Even in this simplified case we see that total revenue in creases with quality (more talented people make more) and [**this is important**] because both price and quantity provided increase with talent, total revenue increases in talent more than proportionally. That is, if I am twice as talented as Dean Westerfield {a conservative estimate!}, I will make *more* than twice as much. This implies a concentration of income in the most talented people.

Section B.

This is the case where the cost of providing additional performances is 0. This may seem strange, but think of a movie. The extra cost of providing an additional screening is, if not 0, then at least very low relative to the cost of the movie. Moreover, as Rosen points out in the parenthetical remark in the paragraph at the bottom of the left column of page 852, constant marginal cost – which is true in the movie case – will do as well as 0 marginal cost for this section. In this extreme case there will me only one provider of the service, one star, who will meet the entire market.

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[1] Note that this ignores as beyond the scope of the paper the possibility that the Stones adopt special affects for the Coliseum show that cannot be done in a club and serves to offset the decline in qulaity associated with a larger venue.

What does this mean? Imagine that there was no live theatre and no television. Only 1 movie will be made, *Hamlet*. Now, there may be many movies of Hamlet made. Every actor in the world wants to play the part. Who will get it and how many movies will be made. Well there will be only one movie made and it will have Olivier in the role, not Mel Gibson. No one will go to see Mel Gibson since, at the margin, the same price will be charged for the Olivier Hamlet as for the Gibson Hamlet. This is an extreme version of the concentration we are trying to analyze. We see that very small differences in quality can lead to very large differences in income.

Section C.

In this section Rosen shows that, if the services provided by more talented sellers are less affected by competition from other sellers, then even if there is more than one provider in the market (as opposed to the previous section) it will *still* be the case that higher quality providers handle larger crowds and the skewed distribution continues to exist. In the final paragraph of this section Rosen offers a simple example in which a seller with twice the talent, has a market that is four times as large and earns 16 times as much by charging twice the price of her less talented competitor.

Section 4

Here Rosen considers what happens if all consumers are not identical. The main results still go through. The subsections in this section are verbal expositions of his main themes and you should be able to handle these on your own. This section is important and you should study it.