

DETERMINANTS OF MARKET
STRUCTURE AND THE AIRLINE INDUSTRY

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Abstract

This lecture explores the general economic determinants of market structure with special reference to the airline industry. Included are the following facets: absolute size of firms; distributions of firms by size; concentration; entry barriers; product and service differentiation; diversification; degrees of competition; vertical integration; market boundaries; and economies of scale. Also examined are the static and dynamic properties of market structure in terms of mergers, government policies, and economic growth conditions.

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I would like to talk about the classical economic tradeoff: efficiency vs. equity. In order to try to say something we try to set up models. One of the areas in which we do this is industrial organization: the structure, conduct and performance of one industry or a group of industries. There is quite a bit of work done here, but I don't think it's all quite applicable to the airline industry.

Now, all these models begin by assuming a) that we're dealing with firms, b) that these firms produce a homogeneous product that is not really subject to much quality variation. As a consequence of that the only attribute of this product which the firm controls is the price. Now these are sort of zeroth order assumptions, but they beg a lot of questions, particularly: What's the firm? What's the homogeneous product? and What's the price?

The firm I think is best defined implicitly: we say that it is the decision making center. Someone makes decisions controlling inputs and producing outputs. Somebody takes information (basically assumed to be prices from particular markets) and makes decisions combining these factors by taking in the inputs and produces outputs. We assume this decision maker, whoever he is, has some goal and the goal is usually that he maximizes profit, defined as the difference

between revenue and cost. Now this is obviously a somewhat strained definition: between the economic firm and American Airlines there is obviously quite a bit of difference. The firm is related to the modern concept of the profit center. But you seldom have a particular group of people who make one product, control one price, and take the other prices in from the market, and produce an output.

In defense of the economics of a firm it is true that we do try to practice profit maximization. The perennial argument that the firms don't maximize profits is really rather spurious because we don't really have to claim it for most of the conclusions that we reach. We don't need the fact that the firms have a profit function where they set all of the first derivatives to zero and find a maximum. For most of the conclusions all we really need is that the firm strives for the maximum in profit. There are some questions as to how fast they get there.

The difference is between analytically maximizing the function against numerically maximizing it. The outcome is the same. All we really need to postulate is that the firm is trying for this goal; it is not necessary to reach it right away.

As we set up this kind of world we can distinguish two

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determinate market structures which Professor Tideman talked about earlier; these are competition and monopoly. Now I'm certain that nobody here really believes that either of these serves as a realistic model. But again, that's not really their purpose: their purpose is to provide a standard, to provide an ideal. If we had such and such a situation, we would have the resulting outcome which would have certain properties. We can then compare existing situations to these standards and try to infer from that something about the properties. In competition we end up with a long run equilibrium situation in which the only sustainable price is equal to the long run average cost which in turn is equal to the marginal cost. This is because of the requirement that the only sustainable condition occurs when each firm is producing at its minimum long run average cost. This situation appeals to the economist as it is the most efficient solution: there's no way to make you better off without making somebody else worse off.

The contrast to this is a monopoly situation in which we can't say very much about price or quantity but we can say that the firm, if it's going to maximize profits, will balance off the gains to revenue from any action against the additional costs incurred. When these are equal, profits will be at a

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maximum. Again this raises all sorts of questions like the term over which the firm is thinking about: short or long run profits. Things may be very destructive to profits in the short run and very crucial to profits in the long run.

Most of these questions, however, are ignored and the more realistic models all deal with the world of imperfect competition. The reason that we don't talk much about the problems I guess is because you really can't say very much. You must begin to assume that the firm is really behavioral, that, after all, a firm is managed by a group of individuals. The individuals have various goals: they have stock in the company, or they do not have stock in the company. The stock may be a small part of the company's net worth; but it may be a very large part of the Chief Executive's net worth, so he would be interested in maximizing capital gains. A variety of circumstances are going to affect the behavior in the top managements: status and prestige, particularly. The results of these influences are something that we can call slack.

This again is particularly important. When we talked about the production policies that each firm was following, we assumed the firm ended up on the production function, and so it was getting the most possible output from any given set of inputs. Well, it's doubtful that the firms are always there

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and the question really is how close they are. There has been a lot of argument that in fact we have quite a lot of slack in the U.S. economy. Big firms do not get the most out of their inputs. Workers could produce more, and machinery could be used more heavily. This, of course, is a very hard thing to talk about because we don't have any measures. There's no way of telling how much a firm could have produced unless you find a more efficient firm that is really identical and find they're producing 10 times as much output as you are from the same input. Then you're inefficient. Unfortunately you seldom have those comparisons. This means is if there is slack and you have a management that's composed of people who have a variety of goals, they aren't necessarily bound to the market. If demand falls off a little bit, they can still keep profits up by becoming a little better managers. At the same time, if the demand is really soaring, managers may take more leisure time and may not worry so much about the office. They take trips to Waterville Valley or something like that. This type of play in the system is not really talked about, and we don't really have a role for it in the competitive model at all: we assume it isn't there.

Managers also have control over quality. In the airline industry, as we will talk about a little bit later, there is really enormous control over the various other attributes

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in terms of the size of the steak, the size of the salads, and things like this. In a big firm you have tremendous capacity to alter the quality of the product that you produce. Related to quality is advertising. Firms compete to a large extent by different selling of their wares in the media. This helps to distinguish their product. A product which is sold only by television advertising is a lot different than a product sold by somebody who never has any access to television. It's not surprising that certain industries, particularly the drug industry or household product industries, prefer to spend 150% of the first 2 or 3 years' revenues in advertising. A good example is Comet Cleanser.

Again, this really doesn't effect the economic models because in the competitive situation the firm has to be on its long-run average. If it isn't, it is going to go out of business.

In a monopoly there's no need to advertise, because you are the entire industry so that if anybody wants to buy your product, they have to buy it from you. In this area of imperfect competition there's one strain of views which is associated with Professor Galbraith, who is probably not the most popular economist in the profession. He has stressed one point, which I think today most people are willing to accept: in this area of imperfect competition goals are

important. We talked about the group which he calls the technostructure, which is just his name for the group at the top which runs the company; the management. He stresses that they have goals and that probably the foremost goal is corporate autonomy (protecting yourself). This mandates certain economic criteria: minimum acceptable profit rates and minimum growth rates (Exactly what the tradeoff is between them nobody knows.). There are such situations and these kinds of goals are formulated.

Then we have a variety of other behavioral models, satisfying models. Firms don't try to maximize profits, they try to maximize some other function. In other words, they simply try to get at least a 5% increase in profits over last year. The problem with all these models is that there is very little we can say in terms of determining the outcome. In fact, we can't say whether this is going to be efficient or inefficient; we don't know. It's possible to have a firm in imperfect competition that is producing a very good product of high quality, at low cost, doesn't spend much money on advertising, and has all the nice economic attributes. Equally so we could have an opposite firm that produced a horrible product, bad quality and high prices; it was able to maintain a position by very wasteful advertising.

How do we apply this to the airline industry? Well, I

decided what we really wanted to do was to try to answer five questions:

1. What is the industry?
2. What is the product?
3. What is the market?
4. What is the competition?
5. Within the industry itself, what are the means of competition?

First, what is the industry? It's a variety of industries. There are the trunk carriers. These are the major airlines. These were created and designed to provide basic city to city transport between major city points, major population centers. The next level is what is called the regional carriers. These were created to be feeder airlines to bring air service to the rest of America and to provide ways for the people in these areas to get to central cities and to major population centers to get on trunks and then go back. In order to do this, a subsidy program was set up by the Federal Government to guarantee that these airlines would serve small cities that otherwise couldn't justify it.

There have grown up, in addition to these, a variety of others. There are supplemental carriers which basically do a charter business or freight business. These are very important internationally but less so domestically. There are carriers

which carry only freight; for example, Flying Tiger Airlines. The regional carriers are North Central, Mohawk, Allegheny, and Ozark, etc.; and supplementals are something like World. Lately there are the third level carriers, which are the air taxis, the small airlines.

Allegheny Airlines is the regional carrier which has been very successful in using third level carriers as a means of reducing its obligations to serve small points. Under contract Allegheny yields its route to a commuter company which agrees to call itself Allegheny Commuter Airlines. In turn, Allegheny performs certain services for them. What you have are third level carriers feeding into the regional carriers, which in turn are becoming more and more like trunk carriers. Regionals now often serve major cities; they often provide service between major population centers as well and are very apt to be competing with trunks on certain routes.

Finally, there is the category of intrastate carriers, particularly in California, Alaska, and Hawaii. They are hard to classify; for some of them are quite large and some are quite small.

The obvious product is transportation. You get on an airline and move from point A to point B. What matters also is how convenient it is to make reservations, what the ground arrangements there are when you get to the airport, and was it

a convenient trip? You may fly American both ways, even though an Eastern flight is more convenient because your car is parked at an American garage, which is a 15 minute walk from the Eastern terminal. There are a variety of things on the ground which would affect your choice of which plane you take such as the time your plane takes off and the type of plane you get. If you get a DC9, you'll feel cramped; so you want a 727. Also what inflight service do you get? Do you get a snack or do you get a whole meal?

Again, this complicates the product. All the airlines really have to provide is transportation, and they have to provide transportation either 6 abreast or 4 abreast. That's all they are legally required to do; everything else is completely under their control. At a time of strict economic conditions they can cut down on a lot of the extras. Alternatively, when traffic is booming, when they're trying to get more people on and when they make certain that they don't lose you because they think that you're going to be travelling a lot, they provide varieties of frills which really don't cost very much, although they are not cheap. (The average cost of a lunch in coach is something like \$4.50 where the average cost of a snack is \$3.80; there's not a great deal of difference. On the other hand, when United Airlines cut out serving Macademia Nuts on their trip from Hawaii, they saved a total of several hundred thousand dollars over giving you a package of regular nuts.) Since they fly so many, even

minor changes in service can mean major total cost considerations. This is the slack I was talking about before. The airlines as an industry are characterized by an enormous degree of variability, particularly with respect to passenger service.

In times of economic turndown, a greater share of the passengers are people who really have to fly. They are not passengers that have alternatives in terms of not flying! They are going to fly any way. You may not have to give them good service. As you get more marginal customers who don't have to fly, you have to keep them happy and at the same time keep everybody else happy. This means that you provide unofficial services.

Next, what is the market? Again, you separate this by purpose, (business vs. personal), and city pair (because it's clear that there are thousands of markets in the U.S. which are basically each city pair: Boston-Washington is one market, Boston-New York is another, Washington-Chicago, Washington-L.A.--these are all different markets.) It's not fair to say that there is only one market for airline travel, because again you have different proportions of business and pleasure travellers on each route and too many different considerations involved. In pleasure travel, again to

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Washington, people are much more likely to take the car because it's a shorter flight and they can drive it very easily in one day. For California, it's a different situation; you're likely to have a great proportion of your travellers wanting to go by air. You have to distinguish feeder routes, which connect rural areas, to the population centers or the trunk routes. On international flights, you have questions about how long the flights are, whether it is a non-stop flight (or 7 stops along the way). Again you can have markets in which the airlines can decide to service only business customers. If there are some pleasure customers they take them, but they direct their appeal to business or vice versa.

What is the competition? Well, obviously there are the other carriers, if there is more than one on a particular route. There are trains in some areas, buses, and passenger cars. Particularly for personal travel the auto is the greatest competitor. For business travel I would suggest that one of the biggest competitors is no travel at all. Telephone, teletype, telex, or various other things substitute imperfectly but work almost as well when air travel is expensive.

How do the carriers compete? Well, here you have as many ways as have been listed so far. There are all those things that vary services or quality. They can vary advertising;

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they can vary their prices. This is a regulated industry where prices are all established--technically they are not, but in effect they end up being the same as if established by the Civil Aeronautics Board. However, in certain cases an airline is able to compete in price when its cost structure is different from the cost structure of one of its competitors. Some carriers may be able to support a lower fare. The marginal profits of certain operations is higher in some airlines than it is in others. American, for example, claimed for years that the youth fare (they were the initiator of it) was profitable, where some of the other airlines said this wasn't true and that they found it to be expensive. If cost structures are different, (you fly a different aircraft on a route or the destinations are both intermediate stops on longer routes), then you can offer special discount fares which the other carriers really can match only at much greater costs.

There is a problem in competition because there seems to be some evidence that the proportion of seats you sell on certain routes does not vary directly with proportion of seats you offer. If you decide you want to go from a 10% to a 15% market share you may have to double your capacity from, say, 20% to 40%. There is a nonlinear relationship between the capacity you offer and the number of seats you sell. This particularly favors the established airline, the

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dominant airline will tend to become more dominant. The more capacity he is able to offer, the more seats he's going to be able to sell because people get used to it. People learn that Eastern flies every hour on the hour or American flies every half hour on the hour, but the other airlines only every two hours. So, if they want to take the next flight, they just call that airline first.

And, of course, airlines compete with various types of aircraft. There is a lot of competition in advertising offering DC10's with their lounges, or 747's with their lounges, as opposed to some other type of plane. The airlines have a variety of ways to compete but none of them are really directly price related, though they cost the airlines various amounts of money. It is very hard to say anything about which type provides which benefits for such and such a cost. If we do want to characterize the industry, I think we can say a couple of things largely dealing with this idea that you have to have a large capacity to guarantee a large share of the seats. It is what's called a heavy fixed-cost industry. The marginal cost, the additional cost of putting you on a plane when the plane is not full, is obviously very close to zero. Except for the amount of food and beverage service you may get on board and maybe a couple of minor things, such as losses

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on baggage, etc.--that's it: and the entire cost is peanuts. In the short run you have a fixed number of planes which are on set routes, these routes are scheduled flights (you must fly them according to the regulations) and so there's very little you can do. Even your labor is fixed (you have strict contracts on your labor). It takes time to train a pilot. You cannot overnight say, well, "I'm busy tomorrow on this flight so I'm going to take a 707 out and put a 747 in." You may not have a 747 pilot or a whole 747 crew. You may have the aircraft but you don't have the labor to switch. You have a very restricted industry which really has to live within the constraints of the schedule. There is very little ability to get around it. As a consequence you have massive price discrimination. The people flying on the same plane are paying a large variety of fares, particularly on a long flight such as from N.Y. to the West Coast. You have family plans, you have youth fare, you have military fares, you have military stand-by, military reserved, youth fare reserved, so the airlines get to pick and choose by offering different types of service and different contingencies under which they may or may not board you. They get to offer these lower fares to people who might otherwise take another way. Eastern's Leisure Class, I guess, is a particularly

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good example.

The other thing that is characteristic of the airlines is cross subsidization. There is no passenger who pays exactly average costs. Every passenger is being subsidized by some other passenger or he in turn is subsidizing some other passenger. This is particularly true on the regional carriers where there is a formal subsidy program whereby the CAB each year requests Congress for enough money to subsidize these carriers so that they don't lose money for servicing small points which board very few people. What the CAB does is grant route strengthening awards. The way you stabilize an airline in financial trouble is to give it a profitable route. What this means, of course, is that the people who are flying on that route are making money for the airlines and in turn are being used to subsidize fares on another route. Everybody charges the same fare. In California there is PSA (Pacific Southwest Airlines) which is an intrastate carrier which flies you from L.A. to San Francisco and vice versa for about $\frac{1}{2}$ of the fare that you would pay if you were flying an interstate carrier subject to CAB rules. The CAB pricing formula is basically a certain fixed amount for each ticket plus so many cents per mile, and the so-many-cents per mile varies with how long the flight is. There

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are much cheaper fares at PSA, so there has been considerable question about how justified the high fares are from Washington to Boston. If you had PSA flying Washington to Boston the fare would be just half as much.

The last thing that we want to talk about is the fact that we are dealing with the regulators. The trunks and the regional carriers are completely under the control of the CAB. The CAB has numerous powers. They must approve all tariffs. This means they must set all prices. To determine if a tariff is fair or not they determine what should be rate base of the company. By this they add up in some way to determine the total amount of capital invested in the firm. Secondly, they try to determine the fair rate of return. Now both of these are nearly impossible questions to get a completely solid analytical answer to. How do you value planes? Do you value them at their new cost? Replacement costs? What you sell them for in the market? How do you evaluate a fair rate of return? There are some risks involved for the airlines certainly because of the fact that they are scheduled carriers; they must fly.

The most important power is the power to gain control of routes. The CAB controls which route you are able to fly. Now this can be crucial. If you're a regional carrier and

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you just bought some long distance airplanes and you're flying a lot of short hauls, you may desperately need some longer routes. North Central Airlines, for example, flies nonstop Milwaukee-New York, which is totally non-regional service. These routes were given in an effort to strengthen the airline so they could lower the subsidy. What this means in effect is that these people who fly North Central from Milwaukee to New York, or Minneapolis to Denver are in effect subsidizing the people who fly on North Central from Grand Forks to Hibbing and something like that. When you're flying on these puddle jumps you're being subsidized by the larger, longer routes. The same airplane which is flying you on the short haul may as soon as it gets to Milwaukee or Minneapolis or Madison turn around and become a long haul plane and fly to New York. How do you once again separate the costs? You can't do it. Anything that you came up with would be purely a matter of convention.

The CAB also controls entry, but the more important issue is that they control mergers. This relates to the economies of scale. If you get larger and larger airlines, are they going to be more efficient in providing service? There is some argument for this: you use your plane more intensively, you can guarantee the use of your pilots, you

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have one reservation center, you may be able to handle a lot of people, and a lot more cities very easily. Once you set up the software and the hardware to handle all your division centers, it's good enough to handle maybe double or triple what you have so that there are clearly some economies of scale. Is competition good? Is service to an area really improved by having competition? Well, what is all this saying? There really are an enormous amount of things that you have to consider when you try to determine analytically whether should we do this or that. The issues involved are extremely complex. They involve the industry, the product, the market, what the competition is on the route, and, particularly here, social concerns. In Washington National you have the noise pollution of the planes flying over Georgetown. In fact there are some safety factors involved; there have been a couple of air crashes that have been attributed to trying to lower noise in flight procedures.

On the other hand it is clear that a flight from Boston to Dulles is not the same as a flight from Boston to National for most people. So the product that the airlines provides is in terms of transportation from inner city point to inner city point. It involves a lot of variables which are beyond the airlines' control in a direct sense is limited.

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