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U.S. Airline Antitrust Policy and Empty Core Disequilibrium

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Abstract
The concept of an "empty core" is applied to better understand the US airline industry and how anti-trust policy might best be altered to help the industry perform better for both consumers and investors. Horrendous financial losses over the long term suggest an empty core and point to likely increases in future industry concentration. These and other related problems might be solved by allowing competing airlines to more freely form alliances. The industry's history of incredibly intense competition suggests that any problematic tendency to turn efficient cooperation into inefficient collusion might well be prevented by natural rivalries.

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I. Introduction

The dismal financial performance of the U.S. "legacy" airlines, the major hub and spoke network carriers, is extraordinary. Even before all the bankruptcies from the problems of terrorist attacks of September 11, 2001, and subsequent surging fuel costs, returns for the airlines were at the bottom of the charts. Table 1 shows long run rates of return for airline stocks versus the S&P 500 and the Dow Jones Industrials. (These four were the legacy carriers that avoided bankruptcy in the period depicted.)

So, for example, investors who bought all four airline stocks at the start of 1980 and subsequently sold them on August 31, 2001, earned a return of 333 percent, about a third of the return for the S&P 500 or the Dow. But that was a comparatively good period for the airlines![1] By any definition this industry has never come close to

[1] In many cases, of course, these sorts of rates of return are very sensitive to particular buy/sell dates. However, as these figures suggest, that was not at all the case with the airlines. Basically, there was no long run period in which any legacy airline performed as well as any common stock index. Profits were better, though

earning normal long run profits. Indeed, even the short run profits are generally dismal. Pilarski (2007) shows that, since deregulation, the U.S. airline industry had only one year, 1998, in which revenues were high enough to cover opportunity costs (cost of capital).

Table 1. Percentage Return on Investment.
This chart shows the return on investment (percent) for each investment as of August 31, 2001, based on purchase at the start of the year on date shown.

	1980	1982	1984	1986	1988	1990	1992	1994	1996	1998	2000
American	489	502	86	37	74	20	-10	-11	-16	-49	-41
Delta	429	289	143	110	103	29	20	41	14	-32	-16
United	351	562	200	92	41	-16	-30	-31	-16	-62	-41
US Air	65	8	-58	-64	-59	-50	-21	-14	-15	-79	-42
Four Airline Avg	333	340	93	44	40	-4	-10	-4	-8	-56	-35
S&P 500	893	842	594	435	341	244	177	135	78	16	-19
Dow Ind Avg	1036	1042	715	533	408	284	209	150	84	26	-9

Source: http://www.yahoofinance.com. Retrieved November 2001.

We would normally expect capital markets to reduce investment in airlines as necessary until returns reach, or at least tend toward, normal, acceptable levels. While one can point to a number of factors that make the airline business unusually risky – extremely powerful and sometimes very militant labor unions, lenient bankruptcy laws that encourage lingering excess capacity, etc. – these risks have existed and presumably been well understood for some time. Such broadly predictable problems cannot, therefore, explain three decades of extraordinary futility.

Telser (1994), Bittlingmayer (1990), Button (1996), Antoniou (1998), and Nyshadham and Raghavan (2001) maintain that the airlines' horrific financial performance, among other problems, follows from an unusual disequilibrium problem known as an "empty

still below normal, during the roughly forty years of airline regulation, mainly because there was zero new entry during that time and prices were kept inefficiently high by regulation. See Poole (1981), Chapter 5, for a more detailed discussion.

core." Jenkins has championed the theory of an empty core in air travel in the financial press.[2] Telser (1987) shows that an empty core may arise from several complex situations in oligopoly, relating mainly to indivisibilities in production and demand. To illustrate an empty core in the simplest terms, suppose that a given industry's cost structure and demand are such that if there are two firms in the industry they will earn above normal profits but that entry by a third firm will result in profits below normal. Thus, normal long run equilibrium is unattainable while short run outcomes are unpredictable. One possible result is perpetual losses if competition for the field routinely results in too many firms in the field. However, this situation can also lead to perpetual undersupply, even zero supply, if firms eventually abandon an industry prone to horrendous losses.

Firms might readily work things out in the simple case presented, but problems and solutions in an empty core can be very complex. Indeed, a weakness in the existing literature is that the examples presented tend to offer little practical guidance because they are either extremely abstract or, at the other extreme, trivially simple.[3] So, let us sketch a richer example that attempts to capture the insights of empty core theory and the nature of the problems plaguing the airline industry without getting bogged down in the theoretical details of game theory or other abstractions.

II. A Practical Illustration of an Empty Core in the Airline Industry

Suppose a smaller city, call it Smalltown, is served by, say, Network Airlines, with several flights each day to Hubtown, and from there to destinations around the world. However, let us assume that this result is not Pareto-optimal in that there is enough demand for non-stop service to other cities to cover the cost of another, lower cost airline supplying that service. Accordingly, suppose next that, say, Direct Airlines establishes non-stop service from Smalltown to several key destinations. Naturally, demand for Network's service to those same cities plummets.

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[2] See, for instance, Jenkins Jr,, Holman. 2008. "The Second Death of the US Airlines." *The Wall Street Journal,* A13.

[3] There is also a related literature on optimal collusion; see, for example, Athey and Bagwell (2001).

Some responses that a firm might normally consider are not possible for Network because of indivisibilities in production. For example, since airlines strive to stick to an established three month schedule, reducing the number of flights, at least to any major extent, is not normally an option until after that three month lag.[4] Likewise, switching to smaller aircraft may not be feasible since aircraft do not come in an infinite array of sizes.[5] Dropping out of the Smalltown market altogether conflicts with Network's defining mission to fly consumers to virtually "anywhere they want to go." Moreover, it sets a potentially dangerous precedent; abandoning Smalltown may encourage competitors to challenge Network in other cities. Lacking a feasible means to reduce output, suppose that Network dramatically reduces price on those routes that directly compete with Direct's service.[6]

Let us posit that this response eventually drives Direct out of the Smalltown market, whereupon Network raises its prices back to their original level. Note that even if air travelers anticipate this result, it is difficult for them to prevent it through loyalty to Direct because of the free rider problem. That is, each passenger can reason that her patronage of Direct has too small an effect to keep the airline flying, so she might as well fly Network if the deal is more appealing, even though the long run result, that Direct leaves the market and Network's prices jump back up, is very unappealing.[7] Thus, a stable Pareto optimal outcome is unattainable for Smalltown under these circumstances.[8]

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[4] Even in the long run, decreasing the number of flights per day is problematic since experience shows that higher flight frequency is key to attracting the more lucrative business traveler segment. See Vasigh et al. (2008), Chapter 3.

[5] Seats could be removed from a given aircraft, but it may be difficult to market the resulting extra leg room in such a small segment of Network's total market. Also, experience seems to suggest that most travelers will not pay much of a premium for roomier seating on most domestic flights.

[6] Since the marginal cost of placing a passenger in an otherwise empty seat is quite small, this can be a reasonable strategy even if the price must be far below average cost in order to entice passengers away from a cheap, non-stop flight.

[7] Airlines sometimes form long term contracts with corporations in such situations, but the cost of contracting with each separate leisure traveler, or even smaller businesses, appears prohibitive.

[8] Notice also that the result for Smalltown might be even worse if it is Direct that survives and drives Network out. Smalltown may gain non-stop service at great

Over the years, the same basic scenario may repeat itself. With only Network in the market there is an inefficiently low level of output; consumers are willing to pay appropriately for some non-stop service. Entrepreneurs correctly sense an unfulfilled demand for a higher quality product, but once provided, consumers fail to loyally support it in the face of Network's competing bargains offered in response. Notice that the non-stop flight option is just an example; most any quality improvement or price cut could trigger similar outcomes. Caught in this empty core, no one is really satisfied, including Network, which is unable to earn normal profits because of these periodic "price wars" it is forced to fight.[9] In basic game theory language, the core is empty in that there is no stable coalition to support the Pareto optimal outcome.

The experience of the airline industry over the last three decades since deregulation is completely consistent with the example just sketched. Many new low-cost carriers have sprung up only to come crashing down soon after while most of the legacy carriers barely hang on.[10] Consumers have benefited from deregulated, lower prices – with sporadic pockets of really low prices, but they complain about all aspects of the airlines' cash-strapped service[11] and endure some frantic rescheduling, especially when low cost carriers suddenly cease operations.

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prices, but this is only to a few destinations, and travelers lose their convenient hub connection to the rest of the world.

[9] Some might argue that Network's response constitutes "predatory pricing," but courts and juries have been skeptical on the grounds, among other problems, that there does not appear to be enough monopoly power to make predation feasible. See Vasigh et al. (2008), Chapter 9.

[10] New airline entry may follow a pattern similar to the "winners curse" that can plague firms in a bidding war over resource extraction. Firms may sense that, because of indivisibilities in production, the industry is prone to either "under" or "over" supply. After decades of oversupply firms may believe that undersupply is coming and fight to establish themselves for the coming good years, with each airline presuming that enough of the others will surely soon come to their senses and withdraw from the market. U.S. policy regarding airport access and gate allocations may exacerbate this tendency. Airlines established at a given airport essentially have an implicit property right in these assets, but once they leave, the gates and access may go to another airline. The airline that surrenders the market prematurely may have trouble returning.

[11] For a recent survey of consumer complaints about airline quality, see Keeton, Ann. 2008. "Airline Satisfaction at 3-Year Low." *The Wall Street Journal*, D8.

III. Solving the Empty Core Problem Through Contract

There may be a better alternative. By definition, a market that fails to reach Pareto optimality is one where a beneficial change can occur without harming anyone. There is a theoretical contract that can solve the problem. As mentioned, negotiations of the sort required with consumers are normally prohibitively expensive, but negotiations between airlines, in the absence of prohibitive regulation, are very practical.

Returning to Smalltown, suppose that when Direct entered the market they proposed a Pareto optimal contract with this sort of arrangement: If Network agreed to refrain from extreme price reductions on competing routes, then Direct would make a reasonable cash payment to Network. Network would gain that cash, would reduce prices on other routes (not flown by Direct) from Smalltown so as to make use of capacity that way, and could rest on the knowledge that, with Direct firmly established, additional entry into Smalltown is much less likely. Network accepts the "devil they know," bearing side payments, in order to avoid, or at least decrease, future devils they do not know. Both airlines earn normal profits in Smalltown while consumers get to have their cake and eat it too – they enjoy a stable market and are connected more cheaply than before to an international hub but can also avoid the stop-and-transfer hub when flying to some major destinations. Average fares are down, non-stop routes are added, total air travel is up, and consumers enjoy steadier quality of service since the airlines serving them are not constantly on their way to bankruptcy.

Naturally, the details of such agreements could vary tremendously. Rather than revenue sharing they might, for example, divide up some markets geographically so they can each enjoy benefits from economies of scale or scope in a given area. Other markets may suffer from different particular empty core problems, though they would all relate to the sort of complexities and indivisibilities in airline networks and demand discussed above. As in the Smalltown illustration, negotiation can lead to more output, improved quality, and even lower prices for a given quality. In any case, the key point is that in any inefficient situation negotiations can potentially lead to a Pareto improvement. Of course, such negotiations could theoretically also turn into nothing more than traditional price fixing, which leads us to our next topic.

IV. The Case for Allowing Competing Airlines to Cooperate

Even the staunchest proponents of antitrust regulation would recognize that the existence of economies of scale, scope, and density can warrant allowing competing firms to cooperate and even, in the ultimate act of industry cooperation, merge. It is easy to see, for instance, how two airlines flying large aircraft filled with passengers might offer lower prices than three airlines serving the same market with smaller, less full airplanes. The possibility of an empty core just adds an additional strong reason why it may well be better for the government to stand aside and allow competitors freedom of contract.[12] It is worth mentioning that the ocean shipping industry provides precedent for this approach. That industry is also widely perceived as suffering from empty core problems and has been granted antitrust immunity for more than a century.[13] Firms are permitted to share revenues, set common prices, and divide up markets.[14] Such freedom to contract could give a huge boost to airlines and their customers.[15]

Conclusive empirical proof of an empty core in air travel is difficult, though the few existing studies – Button (1996) and

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[12] One might wonder if firms could tacitly cooperate their way out of an empty core without formal negotiations. This appears to be exactly how Airbus and Boeing have solved their empty core problem. Consider, for example, production of the giant A-380. It remains to be seen if Airbus can make this behemoth profitably, but it is certain that such an aircraft would not be profitable if *both* manufacturers had built one and then fought over the market. With that danger hanging over their heads, it might have happened that neither would build this huge aircraft. But, in the event, Airbus made clear early on that they would build the A-380 while Boeing got out of the way and pursed their "Dreamliner" instead. However, this looks to be a special industry case. There were only two potential suppliers, and these two, having split their market for many years, know each other very well. The diverse airline industry has many players and a steady flow of new entrants.

[13] See Pirrong (1992) and Sjostrom (1989) for excellent analyses of empty core theory as applied to ocean shipping.

[14] Though the antitrust exemption may be ideal, ocean shipping is not necessarily illustrative of the ideal overall regulatory approach. Ocean shipping is subject to numerous other government regulations and has a dismal financial record not greatly different than that of the airlines. See Brooks (2000).

[15] A growing number of economists maintain that antitrust regulation is pretty much always counter-productive and should be replaced by freedom to contract in all industries. See, for example, Armentano (1996) or, in a more moderate mode, Cranston and Winston (2003).

Antoniou (1998) – do support the theory. The industry's horrific losses and instability strongly suggest an empty core, and certainly show that airline monopoly power and attendant profits should not be high on our list of worries. Even so, experience indicates that regulators' automatic resistance to horizontal airline mergers is unlikely to quickly evolve.

Fortunately, the more politically feasible solution may also be the more feasible economic solution. Airline mergers are problematic even without antitrust objections since the industry's powerful unions generally fight them because of concerns related to seniority. Airline alliances may be the best way to sidestep the unions and solve empty core problems. There is already some tendency toward more relaxed regulatory approval of airline alliances; an extension of this trend may be enough. Since alliances are more readily undone than mergers, it may be reasonable to hope that regulators would be more willing to experiment, allow airlines to cooperate, and potentially solve empty core problems.

Given the complexities of network economics and empty core problems, the ideal approach might be to simply let U.S. airlines form any alliance at will rather than having some sort of regulatory screening process. If prices were raised inefficiently high, then new entrants or coalitions of existing airlines could undercut those prices. Indeed, new airline entrants have not been in short supply even with virtually everyone, except Southwest Airlines, losing money; actual profits seem likely to guarantee new entry. Beyond that, commercial air travel may have enough substitutes to prevent cartel pricing anyway. It is commonly recognized that leisure travelers will seek other forms of transport, or just stay home, if airline prices are raised much.[16] Demand by business travelers is less elastic, but videoconferences and other modern communications are often viable substitutes, as are corporate jets and air taxi services. If serious cartel pricing were to somehow break out anyway, regulators could, of course, intervene at any time – threat enough to discourage airlines from any cooperation that appeared merely collusive.

If a free alliance market proves politically impossible, it could still be worthwhile to, say, approve any alliance on the condition that it doesn't raise prices. However, over time this could be very problematic. Cost increases may require higher prices; the eventual

[16] See Vasigh et al. (2008), Chapter 3.

necessity of reaching a normal profit level may also require some price increases. Since rigid price ceilings are impractical, it is easy to imagine antitrust regulators drifting into a de facto return to cost plus regulation of prices in which airlines must seek approval of every price change and new route lest regulators object and declare previously established alliances "anti-competitive." However, even in that worst case scenario, a full scale return to airline regulation would not be possible since antitrust regulators would not be able to bar new entry, as the Civil Aeronautics Board did for about 40 years.

In a better case scenario, a limited, experimental antitrust exemption would give airlines an opportunity to demonstrate efficient cooperation of the type illustrated above. This could provide a foundation for further deregulation. Moreover, given the realities of an industry awash in bankruptcies, such experimentation seems sensible even for regulators steeped in the traditional opposition to any cooperation between oligopoly rivals. That is, if regulators will not accept more alliances now, they are likely to face higher industry concentration in the future via liquidations and desperation mergers to avert liquidations. Cooperation offers a possible means of preserving more airlines.

V. Conclusion

The U.S. airline business exhibits characteristics of an industry suffering from an empty core problem. Horrendous financial losses over the long term suggest an empty core and point to likely increases in future industry concentration as the airline bankruptcy parade continues. These and other related problems might be solved by allowing competing airlines to freely form alliances. The industry's history of incredibly intense competition suggests that any problematic tendency to turn efficient cooperation into inefficient collusion might be prevented by natural rivalries. However, even if regulators adopt a more cautious, limited approach to approving cooperative agreements, this positive step could provide an eventual foundation for more sweeping freedom of contract between competitors. The alternative, maintaining traditional antitrust opposition to such cooperation, seems certain to result in continuing financial chaos and, ironically, either liquidation of some airlines and/or desperation mergers that increase industry concentration. The choice seems to boil down to one in which both supporters and

opponents of traditional anti-rust can agree: More cooperation now looks better than having even fewer competitors in the future.[17]

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[17] Of course, even with complete freedom to cooperate, it is likely that mergers will be the best option in some cases. But allowing alliances to solve empty core problems would likely reduce liquidations and mergers.

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