PROFITABILITY AND RISK IN AIR TRANSPORT: A CASE FOR DEREGULATION

BY
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Introduction:

A heated debate surrounds the issue of governmental regulation of transportation. Nowhere is the debate more intense that in air transport where the ten U.S. Domestic carriers have reported aggregate losses of $52.5 million for the first half of 1975. Regulators maintain that, while regulation has not been entirely successful, a reevaluation of the existing regulatory framework is all that is necessary. Opponents, on the other hand, argue that deregulation is the only course that can restore the industry's lost profitability.

The purpose of this article is to explore the controversy in air transportation in view of the CAB's goal to foster sound financial conditions in the industry. The intent is to prove that the current regulatory framework has not done so and must therefore be altered.

Criteria for Regulatory Effectiveness:

The acid test of regulatory effectiveness is twofold:

> (1) Regulation (apart from safety considerations, the FAA's function) must provide for efficient service to the public and insure reasonable fare levels,
> (2) Regulation must insure the financial health of the industry regulated. It must allow the industry and its firms to earn their fair rates of return. The latter implies that investors earn returns commensurate with risks and returns in other industries.[1]

Many airline economists have attacked the CAB and its regulatory policies on the first criterion. Jordon, for example, has argued that

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1. Specifically, the carriers must earn returns sufficient to: (1) enable them to attract new capital at a reasonable cost, (2) enable them to maintain their credit standing and financial integrity, and (3) commensurate with returns being earned on investments in other industries facing corresponding risks. For a full discussion, see: Victor H. Brown, "The Direct Testimony of Victor H. Brown", *Domestic Passenger Fare Investigation*, (Washington, D.C.: Civil Aeronautics Board, August 1970), Docket 21866-8, Exhibit BE-T-1, 5.

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current fare levels are much too high, a direct result of inefficient governmental regulation. Douglas and Miller have reached much the same conclusion.[2] This author, however, is concerned with the second criterion, for even if the first is met, the failure to secure adequate returns to investors would result (and has resulted) in severe problems for the industry.

Profitability and Risk in Air Transport:

The methodology used in this paper is a comparative study of the returns to the ten carriers versus returns to other regulated groups (the Moody's electric utilities, gas utilities, and telephone companies) and to various groups of non-regulated industrial firms (again, the Moody's groups).[3] The rationale here is that the carriers must earn returns on a par with those earned by other firms equal in risk. The failure to do so will result in difficulty in financing new capital for the maintenance and growth of assets. The ultimate consequence will be, of course, the financial deterioration of the industry and the bankruptcy of some of its members.[4]

Profitability can be measured in several ways. The key measure used most frequently by stockholders, however, is the rate of return on net worth (net profit after taxes/net worth). It indicates the stockholder's return on his investment base and is tied directly to stock prices. For the purposes of this paper, mean (average) returns for the

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2. Jordon, in his study of the deregulated intrastate California carriers, has concluded that air fares in major California markets were as much as 47% lower than they would have been under CAB policies and authorizations. See: William A Jordon, *Airline Regulation in America: Effects and Imperfections*, (Baltimore, Md.: Johns Hopkins University Press, 1970), 226. The Douglas and Miller study centers on the intrastate Texas market. See: George W. Douglas, and James C. Miller, III, *Economic Regulation of Domestic Air Transport; Theory and Policy*, (Washington, D.C.: The Brookings Institution, 1975).

3. The author selected these groups because they were the sample firms used by Brown in his inputs to the *Fare Investigation* on behalf of the CAB's Bureau of Economics. See: Brown, "The Direct Testimony of Victor H. Brown".

4. If the carriers cannot earn adequate returns on net worth, then stock prices, reflecting investor apathy, will fall. The carriers will be forced increasingly into long-term debt finance to secure needed funds. The net result will be severe financial problems and possible liquidations in the industry. For a discussion of the causes and effects of the increased use of debt finance in the industry, see: Richard D. Gritta, "Debt Finance and Volatility in Rates of Return in Air Transport", *Transportation Law Journal*, VI (January 1974), 73. For a study employing a bankruptcy model, see: Richard D. Gritta, "Solvency and Financial Stress in Air Transportation", *Transportation Law Journal*, VI (July 1974), 139.

1964-1974 period are used. The study period thus encompasses a long enough time horizon to insure that several economic cycles are included.

Risk is often defined as the instability in rates of return over time and is measured by the standard deviation around the mean or average return and by the coefficient of variation. Greater risk is indicated by larger deviations around the average return and higher coefficients of variation.[5]

Table I presents data on the mean returns and risk measures for the ten carriers, plus data for 28 electric utilities, 7 gas utilities, and 3 telephone companies, as well as for 74 industrials and 14 sub-groups of industrial firms. Appendix A provides the same data for the individual firms used in the study.

The contrast between the carriers and the majority of the other groups is striking. No other regulated group has a mean return as low as that of the airlines or a risk measure anywhere near as high. The carriers' mean return of 10.8% is exceeded by that of the gas utilities (14.6%), the electric utilities (12.2%), and the telephone companies (11.4%), while the standard deviation and coefficient of variation for the carriers (9.2% and 1.47) are significantly higher than those of the gas utilities (2.2% and 0.15), electrics (1.3% and 0.11), and the telephone companies (1.3% and 0.11). This suggests that investors in these regulated industries have earned *greater* returns while exposing themselves to *less* risk!

Comparisons to the averages for the industrials (12.5% mean return, with a standard deviation and coefficient of variation of 2.9% and 0.34, respectively) and for all of the 14 sub-groups lead to much the same conclusion. This is especially true of the Chemical and Drug group (16.1%, 2.2%, and 0.14), the Metals and Mining group (16.0%, 2.2% and 0.14), and the Construction Equipment group (14.4%, 2.6%, 0.18), etc. Investors in these groups have earned considerably higher average returns on their investments than investors in air transport and have accepted less risk in the process. In only one case, the Steel group, has the mean return (8.5%) been much lower than that of the carriers. Relative risk, however, has also been considerably lower. (The standard deviation and coefficient of variation for the Steel

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5. Risk is traditionally measured by financial analysts by the coefficient of variation (CV). The CV is the standard deviation divided by the mean. By dividing by the mean return, the CV corrects for size differentials in the levels of the returns themselves. See: J. Fred Weston, and Eugene F. Brigham, *Managerial Finance*, 4th ed., (New York, N.Y.: Holt, Rinehart, & Winston, 1975), 316 and 576.

TABLE I

PROFITABILITY AND RISK MEASURES:
DOMESTIC CARRIERS VERSUS OTHER INDUSTRIES,
1964-1974

	Mean[1] Return	Standard[1] Deviation	CV[1]
Airlines (10 Carriers)	10.8%	9.2%	1.47
Electric Utilities (28 firms)	12.2%	1.3%	0.11
Gas Utilities (7 firms)	14.6%	2.2%	0.15
Telephone Co. (3 firms)	11.4%	1.3%	0.11
Industrials (74 firms)	12.5%	3.0%	0.25
Sub Groups:			
Cigarette, Tobacco (3)	16.5	3.2	0.20
Chemical & Drug Cos. (14)	16.1	2.2	0.16
Metal Mining (3)	16.0	4.6	0.29
Construction Equipment (3)	14.4	2.6	0.18
Food Products (9)	14.4	2.0	0.15
Auto Manufacturers (3)	12.7	5.6	0.49
Business Machines (3)	12.7	2.3	0.23
Retail Stores (3)	11.9	1.9	0.16
Petroleum Refining (8)	11.1	2.4	0.23
Glass Products (3)	11.0	1.6	0.14
Food Stores (3)	10.8	2.2	0.23
Paper Products (5)	10.4	3.5	0.34
Aircraft Manufacturers (5)	10.4	4.6	0.46
Non-Ferrous Metals (3)	10.3	2.8	0.31
Steel (6)	8.5	2.9	0.34

[1] Defined as the average ratio of net profit after taxes to net worth (stockholders' equity) for the years, 1964-1974. The rates of return for each firm for each of the years, 1964-1974, were averaged to determine the mean return for each carrier or firm. The group mean return is the average of the individual company returns. The standard deviations and coefficients of variation (CV) were calculated in a similar manner. The standard deviation and CV for each firm in the group were averaged to obtain the group figure. Data on the individual firms is contained in Appendix A.

SOURCE: Computed from raw data contained in the *Value Line Investment Survey*. following correction to appendix a

group are 2.9% and 0.34, respectively). In those four groups with average returns similar to the carriers, Paper Products (10.4%), Food Stores (10.8%), Aircraft Manufacturing (10.4%), and Non-Ferrous Metals (10.3%), investor risk exposure has also been considerably less, as can be seen from the exhibit.

The following is a breakdown for the individual carriers. It should be compared with the figures for the individual firms in Appendix A.

	Mean Return	Standard Deviation	CV
AAL	6.8%	9.9%	1.46
BRN	11.8%	7.1%	0.60
CAL	11.5%	9.4%	0.82
DAL	19.8%	5.7%	0.29
EAL	1.7%	11.4%	6.71
NAL	15.4%	9.0%	0.58
NW	14.9%	8.3%	0.56
TWA	7.2%	13.0%	1.81
UAL	7.3%	6.8%	0.93
WAL	11.7%	11.3%	0.97

Source: Calculated from data contained in the *Value Line Investment Survey*.

Of particular interest are EAL and TWA, two of the largest carriers. Their mean returns are very poor and their risk measures extreme. The performances of AAL, UAL, WAL, and even of BRN and CAL, are mediocre at best, when contrasted to the vast majority of the individual firms in Appendix A. And while it is clear that not all the carriers (and their investors) have suffered equally, (DAL, NW, and NAL have returns greater than some of the firms in the sample), risk exposure for *all* the carriers has been great.[7] When the last five year period is considered, the results are even more significant. The following data is for the period, 1970-1974.

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6. Financial theory would, of course, suggest that the opposite be true.

7. It can be argued that DAL and NW have been especially blest with sound long-haul route structures in rapidly growing areas of the country and with less competition than that facing many of the other carriers. This has been the result of the historical development of the carriers and of CAB policies, rather than of superior airline management.

	Mean Return	Standard Deviation	CV
AAL	−2.3%	5.8%	2.52
BRN	11.4%	8.7%	0.76
CAL	5.3%	1.8%	0.34
DAL	15.9%	3.9%	0.25
EAL	−0.6%	8.5%	14.17
NAL	8.7%	8.1%	0.93
NW	7.7%	3.4%	0.44
TWA	−0.8%	13.7%	17.13
UAL	3.0%	7.6%	2.53
WAL	11.2%	7.4%	0.66
Industry	6.0%	6.9%	4.03

Source: Computed from data contained in *Value Line Investment Survey*.

Seven of the carriers have experienced a sharp deterioration in their average rates of return and overall risk levels have risen during the last five years. This is particularly true for two of the strongest carriers, NW and NAL, whose mean returns have fallen to 7.7% and 8.7%, respectively. AAL, EAL, and TWA had negative returns, while the returns for CAL and UAL declined by well over 50%.

While some might argue that the economic times have been hard in 1973 and 1974, there can be no doubt that the future for most of the carriers is anything but bright. And it is very debatable whether even a strong economic recovery can completely solve the industry's problems.

Conclusions:

This article has demonstrated that the airlines have not earned returns commensurate with risk. Investors, in fact, historically could have earned higher returns by investing in other regulated groups or industrial firms while subjecting themselves to considerably less risk. This has been the causal variable behind the depressed level of airline stock prices and a direct contributor to the increasingly dangerous use of long-term debt finance that now burdens the industry.[8]

Given the above data, (and that generated by Jordon, Douglas and

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8. See: Richard D. Gritta, "Debt Finance and Volatility in Rates of Return".

Miller, and others), one can only conclude therefore that the existing regulatory framework in air transport has not been fair and efficient. The carriers have not earned sufficient profits and the public has not benefited from lower air fares. Neither criterion noted above has been met. Two questions therefore remain: What are the root causes behind the current situation? And along what lines must regulatory change proceed?

The causes of the financial crisis appear to lie in the CAB's misplaced competitive emphasis. Fruhan has observed that the Board controls most of the key variable affecting airline profitability, leaving the carriers only one crucial variable—scheduling.[9] In increasing new route awards and creating excessive competition in many markets, the CAB hoped to drive air fares down and traffic up. Instead, however, in an effort to dominate market shares, the carriers have been pressured into sharply increasing flight frequencies.[10] The inevitable result has been disaster: over capacity in many city-pairs, seat-wars, and falling profits. The fight for competitive advantage, as it has been labelled by Fruhan, has involved significant financial costs (duplicative advertising expenditures, redundant capacity, and the inefficient allocation of resources, as well as environmental costs), and it is a struggle in which few have emerged victorious.[11]

The ultimate solution to the problem, this author believes, lies in a return to the free market mechanism; that is, in moving toward a deregulated industry with free entry and exit from markets, freedom of price competition, etc. The advocates of continued regulation have not proven their case. Numerous regulatory changes in the past have done little to improve the financial condition of the carriers. The industry has continued to deteriorate and the costs of mis-regulation have been continually passed on to the public. Too often, CAB practices have proven to be more a protector of the inefficient carriers

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9. William E. Fruhan, *The Fight for Competitive Advantage: A Study of the United States Domestic Trunk Air Carriers*, (Boston, Mass.: Division of Research, Harvard Business School, 1972).

10. There seems to be a substantial premium in terms of market penetration in providing greater than the pro-rata share of flight frequencies in a given city-pair. Evidence suggests that if a carrier in a two carrier market provides 55% of the flight frequencies in that market, it will attract 60-65% of the market share; hence, the suicidal drive to increase the number of flights in a given market. For a complete discussion, see: Wesley G. Kaldahl, "The Direct Testimony of Wesley G. Kaldahl", *Domestic Passenger Fare Investigation*, (Washington, D.C.: Civil Aeronautics Board, August 1970), Docket 21866-Phase 7, EA-T-1, 7-18.

11. Fruhan, *The Fight for Competitive Advantage.*

than a force for constructive action. This trend must be reversed. The free market system can operate to correct the abuses permitted by the restrictive barriers to true competition now present. In this manner, deregulation can provide for the more efficient allocation of resources within the industry and guarantee its long-term prosperity.[12]

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12. Any solution to the problem of the industry will be quite complex, however. The danger of rash, ill-timed actions (especially given the current economic situation) cannot be minimized. Any move toward deregulation must therefore proceed slowly. For a summary of the opposing viewpoints and for an experimental plan for deregulation see the CAB Staff Proposal: "Evaluation of Economic Behavior and Other Consequences of Civil Aviation System Operating with Limited or No Regulatory Constraints", *The Federal Register*, Vol. 40, No. 131, Tuesday, July 8, 1975.

APPENDIX A
PROFITABILITY AND RISK MEASURES: INDIVIDUAL FIRMS, 1964-1974

ELECTRIC UTILITIES (28 Firms)

	Mean Return	Standard Deviation	CV*
Alleghany Power	12.7	1.2	0.09
American Electric	14.6	1.3	0.09
Baltimore Gas & Elect.	11.7	0.6	0.05
Boston Edison	10.3	1.2	0.12
Central & Southwest	14.5	0.4	0.03
Cincinnati Gas & Elect.	14.6	1.9	0.13
Cleveland Electric	14.0	0.7	0.05
Commonwealth Edison	12.7	1.3	0.10
Consolidated Edison	7.7	0.7	0.09
Consumer Power	10.5	2.3	0.22
Dayton Power	12.6	2.0	0.16
Delmarva Power	12.9	1.3	0.10
Detroit Edison	10.3	1.7	0.17
Florida Power	12.5	1.8	0.14
General Public Util.	9.9	0.8	0.08
Illinois Power	14.9	2.5	0.17
Indianapolis Power	14.6	2.0	0.14
Middle South Util.	12.6	0.7	0.06
New England Gas & Elect.	10.8	0.9	0.08
N.Y. State Elect. & Gas	11.2	1.1	0.10
Northern States Power	12.5	1.1	0.09
Ohio Edison	13.9	1.3	0.09
Pacific Power & Light	11.5	0.8	0.07
Philadelphia Elect. Co.	10.5	1.3	0.12
Southern Cal. Edison	10.7	1.1	0.10
Texas Utilities	13.9	0.6	0.04
VEPCO	11.6	1.6	0.14
Wisconsin Elect. Power	9.9	1.1	0.11
AVERAGE	12.2	1.3	0.11

GAS UTILITIES (7 Firms)

	Mean Return	Standard Deviation	CV
El Paso Natural	12.3	2.3	0.19
Mississippi River Co.	11.8	3.0	0.25
Northern Natural	12.7	2.9	0.23
Panhandle Eastern	19.6	3.0	0.15
Southern Natural	16.5	0.5	0.03
Texas Eastern	15.8	2.2	0.14
Texas Gas Trans.	13.5	1.4	0.10
AVERAGE	14.6	2.2	0.15

TELEPHONE CO. (3 Firms)

	Mean Return	Standard Deviation	CV
AT&T	9.3	0.5	0.05
General T&T	14.1	2.2	0.16

	Mean Return	Standard Deviation	CV
Rochester Tel.	10.8	1.3	0.12
AVERAGE	11.4	1.3	0.11

CIGARETTE TOBACCO (3 Firms)

	Mean Return	Standard Deviation	CV
American Brands	18.5	5.6	0.30
Liggett & Meyers	11.8	2.8	0.24
Reynolds, Inc.	19.1	1.3	0.07
AVERAGE	16.5	3.2	0.20

CHEMICAL & DRUGS (14 Firms)

	Mean Return	Standard Deviation	CV
AIRCO	9.5	2.5	0.26
Allied Chemical	10.3	3.2	0.31
Amer. Home Prod.	30.4	1.1	0.04
Bristol-Myers	24.0	3.1	0.13
Celanese	11.0	1.8	0.16
Colgate-Palmolive	12.4	1.6	0.13
DuQbfz	15.0	3.7	0.25
Eastman Kodak	20.7	2.7	0.13
Minnesota Mining	18.9	1.1	0.06
Monsanto	11.2	3.6	0.32
Warner-Lambert	15.5	0.5	0.03
Pfizer, Inc.	16.9	1.0	0.06
Proctor & Gamble	16.8	1.0	0.06

	Mean Return	Standard Deviation	CV
Union Carbide	12.8	4.1	0.32
AVERAGE	16.1	2.2	0.16

METAL MINING (3 Firms)

	Mean Return	Standard Deviation	CV
American Smelting	12.9	3.3	0.26
International Nickel	16.0	4.1	0.26
St. Joe Mineral	19.1	6.5	0.34
AVERAGE	16.0	4.6	0.29

CONSTRUCTION EQUIPMENT (3 Firms)

	Mean Return	Standard Deviation	CV
Caterpillar Tractor	17.7	3.9	0.22
Clark Equipment	15.2	2.7	0.18
Pexnord, Inc.	10.3	1.3	0.13
AVERAGE	14.4	2.6	0.18

FOOD PRODUCTS (9 Firms)

	Mean Return	Standard Deviation	CV
Standard Brands	16.2	2.0	0.12
Swift & Co.	7.4	2.8	0.38
Borden, Inc.	11.4	1.3	0.11
Kraftco, Corp.	12.6	0.6	0.05

	Mean Return	Standard Deviation	CV
CPC International	15.0	1.1	0.07
National Biscuit	17.0	2.2	0.13
American Sugar	12.8	5.0	0.39
Wrigley (W.M.)	14.2	0.9	0.06
Coca Cola Co.	22.8	1.8	0.08
AVERAGE	14.4	2.0	0.15

AUTO MANUFACTURERS (3 Firms)

	Mean Return	Standard Deviation	CV
Chrysler Corp.	8.7	6.6	0.76
Ford Motor Co.	11.7	4.3	0.37
General Motors Corp.	17.7	6.0	0.34
AVERAGE	12.7	5.6	0.49

BUSINESS MACHINES (3 Firms)

	Mean Return	Standard Deviation	CV
Burroughs Corp.	12.1	2.3	0.19
IBM	17.6	1.1	0.06
National Cash Register	8.4	3.6	0.43
AVERAGE	12.7	2.3	0.23

RETAIL STORES (3 Firms)

	Mean Return	Standard Deviation	CV
Macy, R.H. & Co.	10.2	1.0	0.10
May Dept. Stores	9.9	2.1	0.21
Penny, J.C., Co., Inc.	15.5	2.6	0.17
AVERAGE	11.9	1.9	0.16

PETROLEUM REFINING (8 Firms)

	Mean Return	Standard Deviation	CV
Atlantic Richfield	8.9	2.1	0.24
Continental Oil Co.	11.1	2.0	0.18
Marathon Oil	12.6	1.9	0.15
Mobil Oil	11.2	2.3	0.21
Phillips Petroleum	10.1	3.3	0.33
Standard Oil of Cal.	11.6	1.7	0.15
Standard Oil of Ohio	9.7	3.4	0.35
Exxon	13.7	2.7	0.20
AVERAGE	11.1	2.4	0.23

GLASS PRODUCTS (3 Firms)

	Mean Return	Standard Deviation	CV
American Can Co.	9.9	1.9	0.19
Continental Can Co.	12.5	1.7	0.14
Owens-Illinois, Inc.	10.5	1.1	0.10

	Mean Return	Standard Deviation	CV
AVERAGE	11.0	1.6	0.14

FOOD STORES (3 Firms)

	Mean Return	Standard Deviation	CV
American Stores	7.1	2.7	0.38
Kroger Co.	11.4	2.4	0.21
Safeway Stores, Inc.	13.6	1.5	0.11
AVERAGE	10.8	2.2	0.23

PAPER PRODUCTS (5 Firms)

	Mean Return	Standard Deviation	CV
Crown Zellerbach	10.4	3.3	0.32
International Paper	10.5	3.7	0.35
Kimberly-Clark	9.6	2.3	0.24
Union Camp Corp.	12.7	3.7	0.29
Westvaco Corp.	8.9	4.3	0.48
AVERAGE	10.4	3.5	0.34

AIRCRAFT MANUFACTURERS (5 Firms)

	Mean Return	Standard Deviation	CV
Bendix Corp.	10.0	2.1	0.21
Boeing Co.	8.6	6.2	0.72
McDonnel-Douglas	12.8	5.9	0.46
North American Rockwell	11.7	2.7	0.23
United Aircraft Corp.	9.0	6.1	0.68
AVERAGE	10.4	4.6	0.46

NON-FERROUS METALS (3 Firms)

	Mean Return	Standard Deviation	CV
Anaconda Co.	6.7	3.2	0.48
Kennecott Copper Corp.	11.1	3.0	0.27
Phelps Dodge Corp.	13.2	2.3	0.17
AVERAGE	10.3	2.8	0.31

STEEL (6 Firms)

	Mean Return	Standard Deviation	CV
Armco Steel	9.2	3.1	0.34
Bethlehem Steel Corp.	8.3	2.3	0.28
Inland Steel	9.5	2.7	0.28
National Steel	9.5	2.8	0.29
Republic Steel Corp.	7.4	3.7	0.50
U.S. Steel Corp.	7.1	3.0	0.42
AVERAGE	8.5	2.9	0.34

* Coefficient of variation

SOURCE: Computed from raw data contained in the *Value Line Investment Survey*.