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# The Liberalization of U.S. International Air Policy: Impact on U.S. Markets and Carriers

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## ABSTRACT

In 1978 the United States implemented a dramatic change in its international air transportation policy. Beginning at this time and continuing to the present the United States signed a series of so-called "liberal" bilateral agreements with over 20 nations. These agreements allowed carriers more freedom with regard to setting both price and capacity on international routes between the signatory nations. This paper uses a data set on passenger traffic between the U.S. and both "liberal" and non-"liberal" countries to determine the effect of the liberal agreements on both passenger growth and U.S. carrier market share. The results indicate that passenger growth is significantly higher where a "liberal" bilateral has been signed, but that there is no effect on U.S. carrier market share.

> The cornerstone of the altered approach to international aviation negotiations that we have been pursuing during the past year ... is our belief that the function of economic activity is to serve consumers rather than protect producers, and the best way to do that is by promoting competition at home and abroad rather than cartelization (Kahn, 1978, p. 159).

## INTRODUCTION

In 1978, the United States government launched a new initiative involving what Harbison (1982, p. 1) called "the most dramatic change in the nature" of bilateral air transportation agreements since the precedent-setting U.S. - U.K. agreement following World War II. Beginning with the signing of the liberal U.S. - Netherlands agreement of 1978, the United States concluded over 20 liberal or partially liberal bilateral air agreements.[1] These agreements allowed carriers to operate on increased numbers of international routes without limitations as to frequencies and capacities and with reduced governmental control over air prices. Preliminary evidence suggests that these agreements resulted in a significant reduction in the level of discount tickets for some international air travellers.[2]

The purpose of this paper is to examine evidence as to the effect of the agreements on passenger flows and on the market position of U.S. carriers. Significant increases in passenger traffic on liberal routes, compared to increases on non-liberal routes, would provide further evidence that the agreements were beneficial to travellers. An examination of the market position of U.S. carriers on liberal routes, compared to their position on non-liberal routes, would provide evidence as to the effect of the agreements on the performance of U.S. carriers.

In order to address these questions, the paper has been structured as follows: Section II provides a brief description of the regulatory structures of international air transportation and of the events surrounding the signing of liberal bilateral agreements by the United States. Section III reviews the studies that have been conducted on the effect of liberal bilateral agreements on air travel. Section IV presents the methodology used for this study, describes the data, and presents the results of the analysis. Finally, Section V reaches conclusions from the analysis and draws some policy implications.

## LIBERAL BILATERALS AND THE REGULATION OF INTERNATIONAL AIR TRANSPORTATION[3]

In 1944, near the conclusion of World War II, representatives of fifty-four allied, non-belligerent and neutral countries gathered in Chicago with the intention of reaching a multilateral agreement on the regulation of international air transport. This agreement was not reached. Instead, governments were left to negotiate the economic aspects of air transport, such as pricing and capacity determination, on a *bilateral* basis. The most significant of the bilateral agreements, since it served as a precedent for many other agreements concluded afterwards, was the 1946 "Bermuda I" accord, signed by the

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United States and the United Kingdom. Features of the Bermuda I bilateral included the following:

- The approval by the U.S. Civil Aeronautics Board of the price-setting machinery of the International Air Transport Association (IATA). IATA, an inter-airline organization formed in 1945, was given an exemption from U.S. anti-trust laws to hold meetings to establish tariffs on international air routes;

- The right of either government to reject a proposed tariff for an international route covered by the bilateral;

- The specification of routes which may be served by airlines of both the U.S. and the U.K.;

- The specification that carriers were free to determine capacities and frequencies on all flights between the U.S. and the U.K., but that flights operated by carriers which continued beyond the other country (so-called fifth freedom routes) could enplane "fill-up" capacity only in the intermediate destination country.[4]

Following the signing of the Bermuda I agreement, the U.S. concluded similar agreements with dozens of other countries. The first major break with Bermuda-type agreements for the U.S. came in 1977 when the U.S. and the U.K. replaced their 1946 agreement with a new bilateral known as Bermuda II. The new agreement was more restrictive than the old, in that it required airlines to submit proposed U.S.-U.K. capacity levels to both governments for prior approval (known as "pre-determination of capacity"). Former Civil Aeronautics Board Chairman Marvin Cohen (1981) cited the signing of the Bermuda II agreement as an instrumental event in the decision of the U.S. to adopt a more liberal approach to future international air agreements. He stated:

> While the U.S. had generally supported a more competitive system for international air transportation than most foreign governments, our government had over the years followed a fairly mercantilistic approach. Bermuda II, however, was so contrary to our fundamental competitive principles that even many of our airlines were astounded. Indeed, within three months after the signing of the agreement, the Aviation subcommittee of both the House and Senate held hearings on the agreement and the future direction of our international air transport policy.

The new approach, instituted in 1978 under the direction of Civil Aeronautics Board chairman Alfred Kahn, emphasized the replacement of existing bilateral agreements with new "liberal" agreements. The liberal agreements differed from previous agreements both in terms of their capacity and their pricing clauses. Fifth freedom capacity restrictions contained in the previous agreements were deleted and wording was added that neither government may unilaterally limit the service of an airline of the other country. The pricing clauses in the old agreements requiring both governments to approve all prices were replaced by either country of origin or double disapproval clauses. With these pricing arrangements all fares are considered in force unless the country where a flight originates rejects the fare (country of origin clause) or both countries together reject a fare (double disapproval). Other features incorporated in the liberal agreements included (Rosenfield, 1982, pp. 478-479):

- The right for each government to designate as many carriers as they liked to fly on authorized routes (known as multiple designation). Many earlier agreements restricted the number of carriers per route to one from each country.

- An increase in the number of routes carriers from both countries could fly between the two countries and an increase in routes incorporating stops in third countries.

- A clause stating that designated carriers shall have a fair and equal opportunity to *compete* on routes governed by the agreement. The Bermuda agreements generally conceded carriers only a fair and equal opportunity to *operate* on designated routes.

Beginning with the U.S.-Netherlands agreement of 1978, the U.S. signed over 20 liberal or partially liberal agreements. Most of the agreements were signed during the period 1978-1982. After this period the U.S. retreated from the goal of signing liberal agreements except where they were seen to directly benefit U.S. carriers.[5]

## LITERATURE REVIEW

There have been a number of authors who have examined the effect of liberal bilateral regulation on passenger traffic or U.S. airline market share. In a paper presenting early results of the U.S. liberal bilateral policy,

Adkins, Langelan and Trojanowski (1982, p. 36) reported that U.S. carrier traffic share on the North Atlantic declined from 45.4 percent in 1977 to 41 percent in 1981. Although the authors did not present results from a formal model, they contended that the decline in U.S. market share was a continuation of a previous trend, exacerbated by a decline in the U.S. citizen share of North Atlantic passengers and a decline in the percentage of passengers carried by the U.S. dominated charter market (Adkins, *et. al.*, pp. 35-40). Their conclusion (p. 47) was that the U.S. liberal bilateral policy "... has not harmed U.S. carriers' ability to compete for scheduled and charter passengers ...".

Gomez-Ibanez and Morgan (1984) examined evidence on passenger growth and U.S. market share from a limited number of liberal and non-liberal routes. The authors found (pp. 114-115) that between 1975 and 1981 the number of passengers increased by 72 percent on routes to three European countries with liberal agreements but by only 21 percent to three European countries with restrictive agreements. Likewise, air travel increased during the period by 194 percent to 2 Asian countries with liberal agreements and by only 49 percent to Japan, with a restrictive agreement. In addition, Gomez-Ibanez and Morgan (1984, pp. 120-121) showed that U.S. carrier market share increased in 4 of 6 European and East Asian markets regulated by liberal agreements.

Boberg and Collison (1989) examined air transportation trends on several U.S. Pacific routes between 1979 and 1987. Trends the authors presented include the growth in weekly flights by destination, growth in monthly seats available by destination, and increase in number of passengers enplaned to destination. Although the authors did not formally model their results or account for external factors, they did conclude that passenger growth to some Pacific destinations may be traced to the signing of liberal agreements.

Pustay (1989) conducted the most formal investigation of the effect of liberal agreements on passenger growth and the market share of U.S. carriers. Pustay regressed passenger growth and U.S. carrier market share on a number of variables, including the existence (or lack) of a liberal agreement using data for the years 1976 and 1984. Pustay's (1989, p. 21) results indicated that the type of regulatory agreement was not a significant influence on passenger growth or U.S. carrier market share.[6] On the other hand, in his simple growth rate analysis, Pustay (1989, pp. 22-23) did find some evidence that liberal agreements contributed to increases in passenger growth and U.S. carrier market share. Pustay found that between 1976 and 1984, passenger growth was 8.9 percent in "liberalizing" countries but only 5.8 percent in "nonliberalizing" countries. In addition, U.S. market share in "liberalizing" countries rose from 39.2 percent to 48.4 percent. This compared to a decline of one percentage point (from 49.4 percent to 48.4 percent) in "nonliberalizing" countries.

In summary, the papers present conflicting results as to the effect of liberal agreements on carrier market share and passenger growth. There are a number of possible explanations for the conflicting results. Three of them are as follows: First, the years used for the analysis are important. Merely taking one year prior to the institution of the liberal agreements and a second year after the agreements have been signed may bias the results. Collecting a series of data both before and after liberal agreements have been concluded may yield more precise results.

Second, the definition of what constitutes a liberal agreement can vary widely from paper to paper. It is important to define, as precisely as possible, which agreements may be counted as liberal.

Finally, it is important to try to control for external variables which may affect changes in passenger share or market share. Factors such as changes in income or U.S. citizen share of passengers may be important predictors of passenger travel or market share on some routes.

## DATA ANALYSIS

### Sources of Data

In order to determine the impact of U.S. bilateral policy on passenger travel and carrier market share, it was necessary to gather data on passenger flows, U.S. bilateral agreements, and factors which could influence passenger flows and market share. These factors include national populations and incomes. Passenger and market share data were gathered primarily from the U.S. Department of Transportation (DOT) (1988a) report, "Air Passenger Travel Between the U.S. and Foreign Countries". The report contained data on passenger flows between the U.S. and 51 other countries for the years 1975 to 1987.[7] Breakdowns were provided on the percent of passengers who were U.S. citizens and the percent of passengers carried by U.S. airlines. The passenger data were checked against data compiled by the International Civil Aviation Organization (ICAO) and were found to closely match ICAO's flight stage counts.

The countries included in the DOT report included almost all of the largest U.S. international travel markets in every region of the world. However, in some regions of the world, such as Africa and the Middle

East, even the larger travel markets were very small. Since slight passenger changes in markets with a small passenger base can appear as large percentage changes and present a distorted picture of passenger or market share growth, only those countries with a 1989 market of 100,000 passengers were included in the analysis.[8]

Population and gross national product figures were gathered from the International Monetary Fund publication, *International Financial Statistics Yearbook, 1990*. The publication provided annual estimates for each of the variables for each of the years in the study.

Data were collected on bilateral agreements from the agreements themselves, when published, and from Harbison (1982) and the Air Transport Association of America (1989). The agreements were deemed liberal if they contained both a liberal pricing and a liberal capacity clause. They were classified partially liberal if they contained either a liberal pricing or capacity clause, but not both. Non-liberal agreements contained neither liberal clauses. In the cases where the date an agreement was signed did not correspond to the date the agreement entered into force, the latter date was used for classification purposes.

## The Effect of Liberal Agreements on Passenger Traffic

It is important to note that the data collection allows for two controls in the determination of the effect of liberal and partially liberal agreements on passengers in a market. The first control is a within market comparison - the level of passengers in a market can be compared before and after the signing of a liberal or partially liberal agreement, holding other variables constant. The second control is a between market comparison - passenger levels can be compared between markets with liberal agreements and markets without liberal agreements for any given year.[9]

Table 1 provides a comparison in the passenger growth rates between liberal and partially liberal U.S. international markets on one hand and non-liberal markets on the other. It can be seen that the average annual growth rate for the liberal and partially liberal markets was 8.5 percent between 1975 and 1989 compared to 5.8 percent for the non-liberal markets. These figures largely agree with those calculated by Pustay (1989, p. 23) over a slightly different period (1976-1984).[10] The difference, however, may be misleading since the liberal and partially liberal agreements were signed *within* the time period of the study not at the beginning of the period, and because other factors may have contributed to the difference in the growth rate.

Table 2 provides a simple attempt to resolve the first of these problems. It shows a breakdown of passenger growth rates for countries that signed liberal or partially liberal agreements, divided into periods before and after the agreements were signed. It can be noted from the table that in 8 of the 13 markets where liberal agreements were signed passenger growth rates increased, while the same was true in only one of the five partially liberal markets. The mean changes in both types of markets, however, were not significant at the 10 percent error level, using a matched pairs t-test. The null hypothesis that the agreements had no effect on passenger growth rates cannot, therefore, be rejected.[11]

A better way to resolve both of the problems with the figures contained in Table 1 is to estimate a regression model. Assume that passenger demand for air transportation in a market can be represented as follows:

$$\text{PASSENGERS} = f(\text{Price, U.S. Attributes, Foreign Attributes}) \quad (1)$$

where:

- Passengers are the number of people per year who travel between the U.S. and a foreign country;
- Price is the average price at which tickets are sold during a year in a U.S. international market (e.g., the average price for tickets sold between the U.S. and France in 1981);
- U.S. Attributes are factors such as U.S. population and U.S. gross income which influence U.S. and foreign demand for travel on U.S. international air routes; and,
- Foreign Attributes are factors in each foreign country, such as population and gross income, which influence passenger demand between that country and the U.S.

However, on all U.S. international routes, for any given year, U.S. attributes would be the same. Year over year changes in U.S. attributes could be captured by including time indicator variables in an estimating equation. The estimating equation for passengers could then be written as follows:

$$\text{PASS} = \beta_0 + \beta_1 \text{PRICE} + \beta_2 \text{POP} + \beta_3 \text{INC} + \Sigma_{i=1}^{43} \gamma_i C_i + \Sigma_{t=1}^{14} \zeta_t Y_t \quad (2)$$

TABLE 1

Average Annual Growth Rates in Passengers
Liberal & Partially Liberal vs. Non-Liberal Markets (1975-1989)

| Liberal & Partially Liberal Countries* | | Non-Liberal Countries | |
|---|---|---|---|
| Australia | 10.4 | Argentina | 5.1 |
| Barbados | 7.7 | Bahamas | 4.7 |
| Belgium | 5.5 | Bermuda | - 0.3 |
| Costa Rica | 10.1 | Brazil | 6.2 |
| Dominican Republic | 7.1 | Colombia | 3.7 |
| Ecuador | 6.9 | Denmark | 3.5 |
| El Salvador | 11.3 | France | 8.0 |
| Fiji | 5.1 | French Polynesia | 3.8 |
| Germany (West) | 8.1 | Greece | 0.2 |
| Israel | 6.4 | Guatemala | 4.3 |
| Jamaica | 4.8 | Honduras | 9.0 |
| Korea (South) | 14.1 | Hong Kong | 10.3 |
| Netherland Antilles | 7.2 | India | 2.9 |
| Netherlands | 6.2 | Ireland | 4.6 |
| New Zealand | 10.6 | Italy | 3.8 |
| Philippines | 4.5 | Japan | 9.1 |
| Singapore | 14.8 | Mexico | 6.2 |
| Taiwan | 11.6 | Norway | 9.9 |
| | | Panama | 1.2 |
| | | Portugal | 5.0 |
| | | Spain | 3.4 |
| | | Sweden | 19.3 |
| | | Switzerland | 7.4 |
| | | Trinidad & Tobago | 5.2 |
| | | United Kingdom | 7.9 |
| | | Venezuela | 5.6 |
| Average | 8.5 | | 5.8 |

* Includes all countries in data set that signed liberal or partially liberal agreements with the United States between 1978 and 1989. No liberal or partially liberal agreements were signed prior to 1978.

- PASS is the number of passengers per year who travel between the U.S. and a foreign country;
- POP is the population of the foreign country;
- INC is the gross national income of the foreign country in constant currency;
- $C_i$'s are country dummies for each country (less one to avoid perfect multicollinearity) coded 1 when the observation is for that country and 0 otherwise. The country dummies are included to account for country specific attributes other than population and income;
- $Y_t$'s are year dummies for each year of the data set (except 1980 to avoid perfect multicollinearity) coded 1 when the observation is for that year and 0 otherwise, and
- $\beta$'s, $\gamma$'s and $\zeta$'s are coefficients to be estimated.

PRICE, however, is an endogenous variable in Equation 2 and should not be used directly in the estimation of passengers. A carrier's price would depend on both demand considerations as well as on the type of regulatory agreement in place, the year of the observation and the country of the observation (to account for price variations due to factors like route length). A price equation could be estimated as follows:

**TABLE 2**

**Comparison of Passenger Growth Rates Before and After The Signing of Liberal or Partially Liberal Agreements (1975 - 1989)**

| Country | Year Agreement Signed | Growth Rate Before Agreement Signed | Growth Rate After Agreement Signed | Change[1] In Growth Rate |
|---|---|---|---|---|
| Liberal Agreements: | | | | |
| Belgium | 1978 | - 12.0 | 8.4 | 20.4 |
| Costa Rica | 1982 | 11.6 | 9.5 | - 2.5 |
| Dominican Republic | 1986 | 5.4 | 11.1 | 5.7 |
| El Salvador | 1982 | 8.9 | 13.1 | 4.2 |
| Fiji | 1979 | 1.1 | 6.2 | 5.1 |
| Germany (West) | 1978 | 15.6 | 6.8 | - 8.8 |
| Israel | 1978 | 21.4 | 3.9 | - 17.5 |
| Jamaica | 1979 | - 3.0 | 6.9 | 9.9 |
| Korea (South) | 1980 | 6.8 | 16.0 | 9.2 |
| Netherland Antilles | 1978 | 11.4 | 6.5 | - 4.9 |
| Netherlands | 1978 | 1.6 | 7.0 | 5.4 |
| Singapore | 1978 | - 4.5 | 18.0 | 22.5 |
| Taiwan | 1980 | 16.7 | 9.6 | - 7.1 |
| Weighted Average:[2] | | 5.5 | 6.0 | 0.5 |
| Partially Liberal Agreements: | | | | |
| Australia | 1980 | 18.1 | 7.3 | - 10.8 |
| Barbados | 1982 | 7.8 | 7.7 | - 0.1 |
| Ecuador | 1986 | 5.9 | 9.3 | 3.4 |
| New Zealand | 1980 | 18.6 | 7.3 | - 11.3 |
| Philippines | 1982 | 9.5 | 0.7 | - 8.8 |
| Weighted Average:[2] | | 12.4 | 7.0 | - 5.4 |

[1] Mean differences are not significant at the 10 percent level for either the liberal or partially liberal markets. The null hypothesis that there is no difference in growth rates before and after the institution of liberal or partially-liberal agreements cannot be rejected at the 10 percent error level.

[2] Weighted by the 1989 passenger totals for each market.

$$PRICE = \alpha_0 + \alpha_1 PASS + \alpha_2 LIB + \alpha_3 PLIB + \alpha_4 TLIB + \Sigma_{i=1}^{43} \delta_i C_i + \Sigma_{t=1}^{14} \omega_t Y_t \quad (3)$$

where:

- LIB is a dummy variable coded 1 if a market is operated under a liberal agreement during the full year of the observation and 0 otherwise. Under a liberal agreement the *a priori* expectation is that prices should be lower than under a Bermuda 1 type agreement. It is expected, therefore, that the sign of the coefficient for LIB be negative;
- PLIB is a dummy variable coded 1 if a market is operated under a partially liberal agreement during the full year of the observation and 0 otherwise. If partially liberal agreements increase

competition, it is expected that the sign of the coefficient for PLIB be negative;

- TLIB is a dummy variable coded 1 for the year a liberal or partially liberal agreement enters into force. It is included as a transitional year variable, since in most cases the new agreement enters into force midway through the year;

- the other variables are as indicated above; and,

- the $\alpha$'s, $\delta$'s and $\omega$'s are coefficients to be estimated.

In order to estimate a reduced form passengers equation, the right-hand-side of Equation 3 can be substituted for PRICE in Equation 2 and the new equation solved for PASS as follows:

$$PASS = \eta_0 + \eta_1 LIB + \eta_2 PLIB + \eta_3 TLIB + \eta_4 POP + \eta_5 INC + \Sigma_{i=1}^{43} \kappa_i C_i + \Sigma_{t=1}^{14} \lambda_t Y_t \quad (4)$$

where the $\eta$'s, $\kappa$'s and $\lambda$'s are transformations of the coefficients defined in the two equations above.

It can be shown, *a priori*, that the signs of the coefficients, $\eta_1$ and $\eta_2$ should be positive (meaning the agreements contribute to higher passenger counts) if the liberal and partially liberal agreements, respectively, also lead to lower prices. It can be shown as well that the coefficients $\eta_4$ and $\eta_5$ should be positive if higher populations and higher incomes are associated with higher passenger traffic.

A growth in passengers model, similar to equation 4 may also be estimated as follows:

$$\Delta PASS = \eta_0 + \eta_1 LIB + \eta_2 PLIB + \eta_3 TLIB + \eta_4 \Delta POP + \eta_5 \Delta INC + \Sigma_{i=1}^{43} \kappa_i C_i + \Sigma_{t=1}^{14} \lambda_t Y_t \quad (5)$$

where:

- $\Delta$PASS, $\Delta$POP, and $\Delta$INC are the year over year changes in passengers, population and income. The coefficients for the $\Delta$POP and $\Delta$INC variables, as well as the coefficients for the liberal and partially liberal dummies, should be positive in this estimation.

Table 3 presents the results of the passenger growth rate and passenger levels estimations.[12] It can be seen from Table 3 that the presence of a liberal agreement had a positive and significant effect on both the level of passengers in a market and on the rate of passenger growth in a market. Partially liberal agreements had no significant effect on either the level of passengers or on passenger growth rates. Since the models were estimated in log-linear form, the coefficients can be interpreted as elasticities. According to the estimations, the existence of a liberal agreement should result in a 11 percent higher passenger growth rate in a market and a 46 percent higher passenger level.

## The Effect of Liberal Agreements on U.S. Carrier Market Share

Determining the expected effect, *a priori*, of liberal or partially liberal agreements on U.S. carrier market share is not as readily apparent as determining the effect of the agreements on passengers. The change from a restrictive, Bermuda 1 type agreement, to a liberal agreement may be expected to have the following effects on U.S. carrier market share:

- positive, if the U.S. carriers are more efficient than the foreign carriers operating in the market. The removal of impediments to competition with the implementation of the liberal agreement should allow more efficient U.S. carriers to "out-compete" foreign rivals;

- negative, if the foreign carriers are more efficient than the U.S. carriers.

The analysis could change if governments decide to subsidize or otherwise support their carriers under a liberal regime. The net effect of liberal agreements on market share is therefore indeterminate, *a priori*.

Table 4 compares the U.S. carrier market share in liberal and partially-liberal markets to U.S. market share in non-liberal markets for the years 1975 to 1989. It can be seen that from 1978, the year the first liberal agreements were signed to 1989, U.S. carriers increased their share of liberal and partially liberal traffic from 39.3 percent to 47.3 percent. In comparison, the increase is only from 52.3 to 52.4 percent for the non-liberal markets. The large increase for the liberal and partially liberal markets, however, may be misleading since it is in large part a function of which countries signed liberal agreements with the U.S.

TABLE 3

Estimation of Passenger Growth Rates
And Level of Passengers (1975 - 1989)

| Variable[1] | Estimated Coefficients (Standard Errors) Passenger Growth Rate Estimation | Level of Passenger Estimation |
|---|---|---|
| Constant | 0.072[2] (0.042) | 13.543[4] (0.057) |
| Liberal Dummy | 0.109[4] (0.038) | 0.461[4] (0.048) |
| Partially Liberal Dummy | 0.011 (0.044) | 0.006 (0.063) |
| Transition Year Dummy | 0.016 (0.047) | 0.013 (0.069) |
| Income | 0.523[3] (0.205) | -- |
| Population | 0.277 (1.130) | 0.490[4] (0.015) |
| Number of Observations | 512 | 590 |
| R-Squared | 0.170 | 0.958 |
| Adjusted R-Squared | 0.070 | 0.954 |
| F-Statistic | 1.699[4] | 223.299[4] |

[1] Time and country dummies not reported due to space limitations.
[2] Significant at one percent error level.
[3] Significant at five percent error level.
[4] Significant at ten percent error level.

Table 5 shows how the percentage of passengers carried by U.S. airlines changed in the markets for which the U.S. signed liberal or partially liberal agreements during the period of the study. It can be seen, that on average, U.S. market share increased by 7.1 percentage points after a liberal agreement was signed and by 2.7 percentage points after a partially liberal agreement was signed. A matched pairs t-test, however, revealed that there was no significant difference between U.S. carrier market share before and after the signing of liberal or partially liberal agreements.

The major problem with the simple comparisons contained in Tables 4 and 5 is that there may be several factors, other than the existence of a liberal or partially liberal agreement, influencing U.S. carrier market share. As was the case with passengers, it is possible to estimate U.S. carrier market share using a linear regression. U.S. carrier market share may be estimated as follows:

$$MS = \beta_0 + \beta_1 LIB + \beta_2 PLIB + \beta_3 TLIB + \beta_4 CIT + \Sigma_{i=1}^{43} \alpha_i C_i + \Sigma_{t=1}^{14} \gamma_t Y_t \quad (6)$$

**TABLE 4**

**U.S. Carrier Market Share**
**Liberal and Partially Liberal vs. Non-Liberal Markets**
**(1975 - 1989)**

| Year | Liberal & Partially Liberal Markets | | Non-Liberal Markets | |
|---|---|---|---|---|
| | Number of Markets[1] | U.S. Carrier Market Share | Number of Markets | U.S. Carrier Market Share |
| 1975 | 0 | – | 44 | 50.6 |
| 1976 | 0 | – | 44 | 50.6 |
| 1977 | 0 | – | 44 | 50.9 |
| 1978 | 6 | 39.3 | 38 | 52.3 |
| 1979 | 9 | 38.8 | 35 | 53.7 |
| 1980 | 13 | 39.8 | 31 | 51.3 |
| 1981 | 13 | 38.8 | 31 | 51.3 |
| 1982 | 17 | 40.4 | 27 | 52.9 |
| 1983 | 17 | 41.4 | 27 | 54.2 |
| 1984 | 17 | 40.8 | 27 | 52.6 |
| 1985 | 17 | 41.8 | 27 | 51.2 |
| 1986 | 19 | 42.0 | 25 | 50.8 |
| 1987 | 19 | 46.1 | 25 | 51.4 |
| 1988 | 19 | 47.3 | 25 | 54.5 |
| 1989 | 19 | 47.3 | 25 | 53.4 |

[1] Includes markets for the years in which new liberal or partially liberal agreements were signed.

where:

- MS is U.S. carrier market share;
- CIT is U.S. citizen share of total passengers in a market. It is expected, *a priori*, that a higher percentage of U.S. citizens will result in a passenger higher share for U.S. carriers;
- and the other variables are as indicated above.

If liberal or partially liberal agreements have had a positive impact on U.S. market share, it would be expected that their respective coefficients should be positive.

A market share growth rate regression can also be estimated as follows:

$$\Delta MS = \beta_0 + \beta_1 LIB + \beta_2 PLIB + \beta_3 TLIB + \beta_4 \Delta CIT + \Sigma_{i-1}^{43} \alpha_i C_i + \Sigma_{t-1}^{14} \gamma_t Y_t \quad (7)$$

where:

- ΔMS and ΔCIT are the year over year change in U.S. carrier market share and U.S. citizen share, respectively.

If the type of bilateral agreement is an important determinant of growth in U.S. carrier market share, it would be expected that the estimated coefficients for these variables be positive and significant.

Table 6 presents the results from the estimation of Equations 6 and 7. It can be seen that neither the coefficient for the existence of a liberal agreement nor the coefficient for the existence of a partially liberal agreement was significant at even the 10 percent error level. U.S. citizen share, on the other hand, was found to be a strong determinant of the share of passengers carried by U.S. airlines on international air routes.

## CONCLUSIONS AND POLICY IMPLICATIONS

Beginning in 1978, the U.S. administration, under the advisement of Civil Aeronautics Board chairman Alfred Kahn, set about to change U.S. international air transport policy. The major initiative of the U.S. became the

TABLE 5

Comparison of Average U.S. Market Shares Before and After The Signing of Liberal or Partially Liberal Agreements (1975 - 1989)

| Country | Year Agreement Signed | Average Share Before Agreement Signed | Average Share After Agreement Signed | Change[1] In U.S. Market Share |
|---|---|---|---|---|
| Liberal Agreements: | | | | |
| Belgium | 1978 | 27.5 | 38.9 | 11.4 |
| Costa Rica | 1982 | 20.5 | 36.9 | 16.4 |
| Dominican Republic | 1986 | 55.9 | 75.0 | 19.1 |
| El Salvador | 1982 | 24.7 | 18.2 | - 6.5 |
| Fiji | 1979 | 26.7 | 24.2 | - 2.5 |
| Germany (West) | 1978 | 49.6 | 49.5 | - 0.1 |
| Israel | 1978 | 11.6 | 32.8 | 21.2 |
| Jamaica | 1979 | 27.5 | 39.8 | 12.3 |
| Korea (South) | 1980 | 17.1 | 21.7 | 4.6 |
| Netherland Antilles | 1978 | 55.1 | 77.8 | 22.7 |
| Netherlands | 1978 | 10.5 | 10.4 | - 0.1 |
| Singapore | 1978 | 98.9 | 21.1 | - 77.8 |
| Taiwan | 1980 | 16.1 | 15.7 | - 0.4 |
| Weighted Average:[2] | | 36.5 | 43.6 | 7.1 |
| Partially Liberal Agreements: | | | | |
| Australia | 1980 | 44.6 | 40.9 | - 3.7 |
| Barbados | 1982 | 70.3 | 73.7 | 3.4 |
| Ecuador | 1986 | 39.3 | 46.0 | 6.7 |
| New Zealand | 1980 | 22.1 | 44.4 | 22.3 |
| Philippines | 1982 | 49.6 | 35.9 | - 13.7 |
| Weighted Average:[2] | | 43.5 | 46.2 | 2.7 |

[1] Mean differences are not significant at the 10 percent level for either the liberal or partially liberal markets. The null hypothesis that there is no difference in U.S. carrier market shares before and after the institution of liberal or partially-liberal agreements cannot be rejected at the 10 percent error level.

[2] Weighted by the 1989 passenger totals for each market.

signing of liberal air transport bilateral agreements which emphasized competition, rather than cartelization, on U.S. international air routes. Previous studies found that the liberal agreements had a significant impact in reducing prices in U.S. markets but the effect on passengers and U.S. carrier market share remained unclear.

This study estimated the effect of liberal and partially liberal agreements on the level of passengers, passenger growth, U.S. market share level and growth in U.S. market share using a data set for the years 1975 to 1989. The study found that the existence of a liberal agreement had a positive effect on the level of passengers and on passenger growth rates in a market. The existence of a partially liberal agreement did not significantly influence the level of passengers or passenger growth. Neither type of agreement had any influence, at all, on U.S. carrier market share or the growth in U.S. carrier market share.

The major policy implication from this paper is that the signing of liberal agreements by

**TABLE 6**

**Estimation of U.S. Carrier Market Share Growth Rates And U.S. Carrier Market Share Levels (1975 - 1989)**

| Variable[1] | Estimated Coefficients (Standard Errors) Market Share Growth Rate Estimation | Market Share Levels Estimation |
|---|---|---|
| Constant | 0.030<br>(0.141) | 3.727[2]<br>(0.801) |
| Liberal Dummy | - 0.024<br>(0.096) | - 0.072<br>(0.124) |
| Partially Liberal Dummy | 0.025<br>(0.124) | 0.000<br>(0.171) |
| Transition Year Dummy | 0.086<br>(0.127) | 0.071<br>(0.175) |
| U.S. Citizen Share | 0.720[2]<br>(0.255) | 0.071<br>(0.204) |
| Number of Observations | 615 | 659 |
| R-Squared | 0.086 | 0.548 |
| Adjusted R-Squared | - 0.013 | 0.502 |
| F-Statistic | 0.864 | 11.87[2] |

[1] Time and country dummies not reported due to space limitations.
[2] Significant at one percent error level.

the U.S. government can expand U.S. international air transport markets without significantly affecting the share of passengers carried by U.S. airlines. The net impact of the liberal policy on these markets, therefore, appears to be positive - greater passenger densities without the loss of carrier market share. Partially liberal agreements, however, do not appear to be a close substitute for true liberal agreements. As long as either one of output or price remains regulated, the agreements appear to have no impact on passengers or passenger growth.

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## ENDNOTES

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1. The term "agreements" is used to include formal agreements as well as amendments to existing agreements, new protocols to existing agreements which change the nature of the agreements and memoranda of understanding concerning air transportation.

2. Dresner and Tretheway (1991, p. 2) estimated that discount fares on routes covered by liberal agreements were 35 percent below discount fares on routes not covered by liberal agreements in the first four years following the institution of the new policy. The authors estimated that liberal bilaterals saved North Atlantic travellers $325 million in fares in 1981 alone.

3. This section draws on work by Dresner (1988).

4. A U.S. carrier, for example, which operated a route New York - London - Paris would be restricted as to the number of passengers which could enplane in London on-route to Paris. Although the precise number of passengers which the U.S. carrier could enplane in London was not specified in the agreement, fill-up capacity was later interpreted to mean about 20 percent of total capacity.

5. See, for example, Feldman (1984).

6. Pustay's results may in large part be attributed to the specification of his model. As one of his dependent variables, Pustay included U.S. carrier share of flights. This variable may be so highly correlated with the dependent variable (passenger market share) as to render the other dependent variables insignificant.

7. Data for the years 1988 and 1989 were added from U.S. Department of Transportation (1988b; 1989).

8. Countries eliminated from the data base included, Egypt, Nigeria, Senegal, Jordan, Kuwait, Saudi Arabia and China. The remaining 44 countries included all those with a travel market greater than 100,000 passengers in 1989 except, Iceland, Yugoslavia, Finland, Austria, Mariana Islands, Belize, Grand Cayman, Haiti, Antigua, the British Virginia Islands, Peru and Chile.

9. It should be noted that the effect of liberal or partially liberal agreements on passenger counts may be understated. Dresner and Tretheway (1991) found that liberal agreements influence prices on adjacent routes; that is, lower prices on liberal routes promote lower prices on adjacent non-liberal routes. On the output side, this would likely imply that passenger counts on routes adjacent to liberal routes may be higher than they would be in the absence of the adjacent liberal agreement. Ideally, this effect could be controlled by including a sample of non-liberal routes not adjacent to liberal routes; a sample which would consist largely of non-U.S. international routes (e.g., Tokyo-London or Paris-Sydney).

10. Pustay calculated the passenger growth over the nine year period of his study to be a total of 116 percent (8.9% per year) in the liberal markets and 66 percent (5.8% per year) in the non-liberal markets.

11. The test compares the mean market shares for U.S. carriers in markets where the U.S. signed liberal agreements. (A separate test was conducted for partially liberal markets.) For a description of the test, see Harnett and Murphy (1975, pp. 364-366).

12. The passenger levels estimation did not include income as an explanatory variable since available data did not convert income statistics into a common currency and effective exchange rates were not available for about half the countries in the sample. The income effect should be subsumed into the country dummies effect for this estimation.