AN EMPIRICAL ANALYSIS OF "THE SOUTHWEST EFFECT":
MARKET STRUCTURE, CONDUCT AND RESPONSE IN AIRPORT-PAIRS
SERVED BY SOUTHWEST AIRLINES AND IN ADJACENT MARKETS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree of Doctor of Philosophy in the Graduate
School of The Ohio State University

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* * * * *

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CHAPTER I: THE PROBLEM, OBJECTIVES AND HYPOTHESES

Financial problems of the U.S. airline industry

In his 1992 Annual Report to stockholders, Herb Kelleher, Chairman, President and Chief Executive Officer of Southwest Airlines Company, observed the following:

"The three years 1990-1992 presented the gravest financial crisis in the history of the airline industry. During this relatively brief period, approximately 40 percent of the total capacity of our nation's largest carriers either ceased operations or began operating in Chapter 11. And the massive losses incurred by the industry as a whole changed its cumulative financial results — stemming from its very inception — from an overall industry profit to overall industry loss. For these reasons, 1990-1992 will long and unhappily be remembered as a time of economic holocaust in the American airline industry."

Throughout its history, the U.S. airline industry has endured regular cyclical swings in profitability. However, the swiftness and severity of the industry's most recent
cyclical downturn was unusually severe. In 1988, the U.S. airlines had their most profitable year with an aggregate net profit of approximately $1.7 billion. By 1990, the industry's financial position had deteriorated to an aggregate net loss of $3.9 billion, a swing of over five billion dollars in just two years. Moreover, during a period of just four years from 1990 to 1993, the U.S. scheduled airlines lost a total of over $12 billion.

Table 1 shows the aggregate annual revenues, operating profits and net profits of the U.S. airline industry during the 1984 to 1994 period.

<table>
<thead>
<tr>
<th>Year</th>
<th>Operating Revenues</th>
<th>Operating Profits</th>
<th>Net Profits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>$ 87,567</td>
<td>$ 2,766</td>
<td>($ 279)</td>
</tr>
<tr>
<td>1993</td>
<td>$ 84,559</td>
<td>$ 1,438</td>
<td>($ 2,136)</td>
</tr>
<tr>
<td>1992</td>
<td>$ 78,140</td>
<td>($ 2,444)</td>
<td>($ 4,791)</td>
</tr>
<tr>
<td>1991</td>
<td>$ 75,158</td>
<td>($ 1,785)</td>
<td>($ 1,940)</td>
</tr>
<tr>
<td>1990</td>
<td>$ 76,142</td>
<td>($ 1,912)</td>
<td>($ 3,921)</td>
</tr>
<tr>
<td>1989</td>
<td>$ 69,316</td>
<td>$ 1,811</td>
<td>$ 128</td>
</tr>
<tr>
<td>1988</td>
<td>$ 63,749</td>
<td>$ 3,437</td>
<td>$ 1,686</td>
</tr>
<tr>
<td>1987</td>
<td>$ 56,986</td>
<td>$ 2,469</td>
<td>$ 593</td>
</tr>
<tr>
<td>1986</td>
<td>$ 50,525</td>
<td>$ 1,323</td>
<td>($ 235)</td>
</tr>
<tr>
<td>1985</td>
<td>$ 46,664</td>
<td>$ 1,426</td>
<td>$ 863</td>
</tr>
<tr>
<td>1984</td>
<td>$ 43,825</td>
<td>$ 2,152</td>
<td>$ 825</td>
</tr>
</tbody>
</table>

Source: Air Transport Association of America, 1995 Annual Report, Washington, DC. Scheduled airlines only.
To put the recent losses into perspective, Table 2 shows five-year averages of operating revenue growth, operating margins and net profit margins of U.S. scheduled airlines over a twenty-five year period ending 1994.

Table 2  Revenue Growth and Financial Ratios of U.S. Airlines

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1990 - 1994</td>
<td>26.33%</td>
<td>-0.63%</td>
</tr>
<tr>
<td>1985 - 1989</td>
<td>58.17%</td>
<td>3.60%</td>
</tr>
<tr>
<td>1980 - 1984</td>
<td>60.96%</td>
<td>0.36%</td>
</tr>
<tr>
<td>1975 - 1979</td>
<td>85.23%</td>
<td>3.24%</td>
</tr>
<tr>
<td>1970 - 1974</td>
<td>67.21%</td>
<td>3.72%</td>
</tr>
</tbody>
</table>

* The five-year percentage change in revenues is based on the change from the last year of the preceding five-year period. For example, 1990-1994 revenue growth is the percentage change in revenues from the 1989 level to the 1994 level.

SOURCE:  Air Transport Association of America, Annual Reports. Scheduled airlines only.

Results in Table 2 indicate the following: (i) revenue growth for the scheduled U.S. airlines slowed dramatically in the 1989-1993 time period; (ii) the industry traditionally operates on relatively low margins even when revenues are growing rapidly; (iii) the industry’s aggregate profitability has been cyclical in the last twenty years; and (iv) the industry’s net losses during
the 1989-1993 period were significantly greater than the losses incurred during the 1979-1983 downturn.

Within months of taking office, President Clinton created the National Commission to Ensure a Strong Competitive Airline Industry with the mandate "to investigate, study and make policy recommendations about the financial health and future competitiveness of the U.S. airlines." In its final report to the President and Congress, the Commission reported that the airline industry "has lost huge amounts of money the past three years, and ... to return their balance sheets to respectability, most airlines would have to achieve profit margins that are almost unprecedented in their history, and sustain those margins for years."²

**Consequences of industry's financial problems**

One consequence of the industry's unprecedented losses has been the cessation of operations by several large airlines and concomitant public concern regarding the industry's overall level of competitiveness. In 1991 alone, large
airline bankruptcies included Midway (the 12th largest carrier in 1990 and the first large carrier certificated after deregulation); Eastern (the ninth largest carrier in 1990 and the third largest as recently as 1986); and Pan American (the eighth largest airline in 1990 and the sixth largest as recently as 1985). The liquidations raise concerns about the level of competitiveness in the airline industry.

In February 1993 Hearings before the Subcommittee on Aviation of the Committee on Public Works and Transportation, U.S. House of Representatives, it was observed that "the reduction in the number of competitors raises serious questions of whether there will continue to be enough competition to sustain the low fares and other consumer benefits of airline deregulation." Even as early as April 1991, the General Accounting Office noted "the recent deterioration of the airline industry's financial health has raised concern that, as carriers are increasingly forced out of the industry, competition will decline and prices will rise. This deterioration could undermine the gains achieved for airline passengers since deregulation."
A second consequence of the industry's recent financial problems is their impact on the industry's ability to attract capital. Alfred Kahn, the former Civil Aeronautics Board Administrator who is widely regarded as the father of airline deregulation, has observed that "low profits may not be in and of themselves a problem unless cost cutting compromises the ability of the industry to attract capital for reinvestment."

The ability to attract capital is vitally important to the capital intensive airline industry. New aircraft are very expensive — a new Boeing 747 can cost upwards of $175 million — and the major airlines traditionally have re-equipped their fleets about every eight-to-ten years due to technological advances (e.g., twin-engine, two-pilot wide-bodies with trans-oceanic range) and new regulatory requirements (e.g. Stage III noise standards). However, "only one of the nation's eight largest passenger airlines [Southwest] carries an investment grade rating from all of the rating agencies." Therefore, most U.S. airlines are facing higher capital costs. Moreover, the liquidations of Eastern, Midway and Pan Am combined with the Chapter 11
status of three other large airlines (in 1992 America West, Continental and TWA were operating under Chapter 11 protection), have led some traditional capital suppliers to shy away from the industry. As a result, U.S. airlines have been faced with higher capital costs and have had to seek new sources of funding.

British Airways made equity investments in USAir by acquiring $300 million of USAir's preferred stock in January 1993 followed by a subsequent purchase of another $100 million of preferred stock in May 1993. According to USAir, the investment by British Airways "provided the foundation for achieving [USAir's] goal of improved liquidity." Similarly, as part of Continental's Chapter 11 re-organization, Air Canada invested $140 million to obtain a 24 percent general voting interest.

A final consequence of the industry's recent losses has been the significant restructuring taking place at most of the major airlines. For example, in 1993, American "...completed a comprehensive review of the competitive realities of its business and resolved that it must change
the Company dramatically." Consequently, American reduced the workforce for the first time "following years of double-digit percentage increases... retired 42 wide-body DC-10 jets... closed its hub operation at San Jose... and allowed regional airline affiliates to add turboprop service on routes where American abandoned jet flights.""
improve productivity by reducing airport turnaround times; and closed hubs at Dayton and Indianapolis.

Even more drastic restructurings occurred at Northwest and United. The former negotiated comprehensive agreements providing for an estimated $886 million of labor costs savings, and, in return, Northwest’s employees will own approximately 26 percent of the voting equity of the airline. Northwest also canceled or deferred new aircraft purchases totaling $3,100 million; eliminated unprofitable mini-hubs at Washington’s National Airport and at Milwaukee; and reduced the number of jet flights at its Memphis hub and replaced them with turboprop service by a regional affiliate.

United also negotiated an agreement with major unions to exchange work rule changes and wage reductions worth approximately $4,900 million for a minimum 53 percent equity interest in the company, and as part of the agreement, United announced plans to start a low-cost “airline-within-an-airline” to offer competitive low-fare service in short-haul markets. In addition, United reduced planned capital expenditures by $6,200 million by
canceling or deferring aircraft orders and accelerating the retirement of 25 older jets. United also sold 16 flight kitchens and downsized the Washington Dulles hub.

Causes of industry's financial problems

Given the significant long-term consequences of the industry's recent losses, the issue of importance to researchers, policy makers, regulators and managers is insight into the causes of the record losses. Are the industry's recent financial problems due to a unique combination of cyclical factors or are they due to structural changes in the industry? If the former, the industry's losses could be viewed as a one-time aberration. If the latter, the recent losses could indicate the industry is entering a new period of post-deregulation evolution.

Since 1991, there have been several public hearings to investigate the financial condition of the airline industry. In addition to The National Commission, the
House Subcommittee on Aviation held hearings in 1991 and in 1993, and the General Accounting Office has prepared several reports on the industry's financial problems. In general, these public hearings and reports cited the following factors as contributing to the industry's losses: (i) worldwide recession in the early 1990s and a lackluster recovery; (ii) high fuel costs and concerns about terrorist actions associated with the Gulf War; (iii) increased leverage and higher capital costs; (iv) capacity additions that outpaced growth in demand; and (v) widespread fare wars, typically attributed to cash-starved carriers operating under Chapter 11 Bankruptcy protection.

In their annual reports to stockholders, airline managers have cited many of the same factors. However, it is interesting to note that the airlines mention an additional cause conspicuously absent from the lists in the government studies. The major airlines have attributed a significant portion of industry losses to intense competition from low-cost, low-fare airlines.
USAir’s management reported

"the airline industry continue[s] to undergo fundamental changes. Foremost among these is the fare structure: consumers are no longer willing to pay the high fares that in the past supported the higher costs of mature full-service airlines like USAir".\(^\text{10}\)

Competition from low-fare carriers was blamed for

"continued reductions in Delta’s domestic passenger mile yield and flat or declining domestic unit revenue. At the end of fiscal 1995, approximately 60 percent of Delta’s domestic origin and destination revenue passenger miles were in markets also served by low-cost, low-fare carriers, up from [32 percent at June 30, 1993]."\(^\text{11}\)

American also identified as its fundamental problems

"increasing competition from low-cost, low-fare carriers; our inability to reduce our own costs to competitive levels; and the changing values of our customers ... Low-cost carriers control the level of airline prices, and the logos of airlines such as Southwest, Kiwi, and Reno are showing up at an increasing number of the airports we serve. While a great many people prefer to fly American, few will pay a premium to do so,"\(^\text{12}\)

The Chairman of United observed that "even the wealthy are concluding that they should buy a lower-priced ticket on Southwest, and use the difference to buy a eucalyptus tree for their home."\(^\text{13}\) United’s Chairman also has been
reported to have said that United’s "$1 billion loss in 1992 would have been a $700 million profit if [United] hadn’t been competing against low-cost Southwest in nearly 20 percent of United’s markets."\textsuperscript{14} In 1993, a U.S. Department of Transportation study echoed these sentiments by concluding that "the primary driving force behind dramatic changes that have occurred and will occur in the U.S. airline industry over the next few years is the dramatic growth of low-cost Southwest Airlines."\textsuperscript{15}

Such claims seem extreme given that Southwest: (i) had less than a nine percent share of total passenger enplanements in 1993; (ii) served fewer than ten of the country’s top 100 routes in 1993; (iii) flew to only 38 airports at yearend 1993; and (iv) between 1984 and 1993 added an average of less than two new stations per year. Moreover, Southwest has consistently operated differently than the other major carriers, eschewing such widespread practices as a hub-and-spoke network, participation in computer reservations systems, interline agreements, assigned seating and in-flight meal service.
Nevertheless, Southwest’s modest growth has received widespread attention recently.

In addition to the Department of Transportation report, two recent articles assessing the industry’s prospects concluded: (i) "unless the industry sits up and pays attention, Southwest will continue playing Wal-Mart to the industry’s Sears, Roebuck & Co. until no other airlines are left";\textsuperscript{16} and (ii) "the gap between the way Southwest conducts its business — and earns money — and the way United, American, Delta, USAir and others operate — largely losing money — is so great that changes those majors must consider are more revolutionary than evolutionary."\textsuperscript{17} Given that the Department of Transportation, several major carriers, and the trade press have reported that Southwest is the industry’s driving force, it is appropriate to undertake an in-depth empirical analysis to either confirm or refute such claims.
Research objectives

The primary objective of this study is an empirical analysis of Southwest Airlines to answer the following question: to what extent is Southwest's presence as the largest low-cost, low-fare airline correlated with differences in the structure, conduct and response* of deregulated airline markets?

Anecdotal evidence suggests there is a relationship between Southwest's presence and significant changes in the markets Southwest serves. For example, "the effect of Southwest on the California [markets it serves] has been to reduce average prices by one-third and increase traffic by 60 percent."¹⁸ A similar experience was reported after Southwest introduced its low-fare service to Baltimore, its first East Coast airport —

"Passenger volume at Baltimore Washington International Airport increased 6.7 percent in 1993 from the previous year ... largely on the strength of Southwest's entry into the BWI market in September ... In fact, passenger volume at the airport for the first eight months

* Structure, conduct and response and other terms used in the analysis are defined in the Glossary.
of the year was down 2.9 percent from the January-August 1992 period... In October, November and December, the first three full months of Southwest operations at BWI, passenger volume was 36.7 percent, 30.8 percent and 31.5 percent higher, respectively, than the same months of 1992." 19

While such developments would be viewed favorably by passengers and airport managers, the same cannot be said of airline managers. Bennett and Craun (1993) report that "Southwest's entry often causes incumbent carrier revenues to drop by half, despite a greater traffic volume, which, at the least, results in added traffic handling costs,"20 and the authors assert incumbent carriers retreat from the market following Southwest's entry.

Based on the preceding evidence, the introduction of Southwest's service into a new market is hypothesized to be correlated with two events. First, demand in the market is stimulated by the introduction of much lower fares. Second, despite the stimulation in demand, the level of concentration in the market increases as Southwest drives out competitors. The hypothesized correlation of lower fares, higher demand and reduced competition in Southwest Markets is referred to hereafter
as The Southwest Effect. The objective of this study is to determine the extent to which Southwest's presence is correlated with changes in competition, prices and market response.

Research interest in The Southwest Effect is motivated by a number of factors. First, Southwest is the only major airline to have earned a profit every year between 1989 and 1993, which suggests that Southwest alone among the majors has developed a product consumers want that can be delivered profitably. Second, Southwest is a very aggressive competitor and the Department of Transportation has reported other major carriers give up and exit markets after Southwest enters. Third, if Southwest is dominating the markets it enters, there is concern Southwest could use its market power as the dominant firm to raise fares to the detriment of consumers. Fourth, several major

* Capitalized terms such as Adjacent Airports, Adjacent Markets, Corresponding Southwest Markets, New Markets, Non-Southwest Markets, Southwest Airports, Southwest Markets and The Southwest Effect refer to specific concepts which: (i) are essential to the study, (ii) have precise technical meanings in the study, and (iii) are defined in the Glossary. The terms are capitalized to avoid confusion with similar sounding terms, such as adjacent airport-pair or new market, which appear in lower cases and which are generic in meaning. Throughout the study, the convention is to capitalize technical concepts defined in the Glossary and not to capitalize generic terms.
carriers have undertaken significant restructurings (e.g., Continental's Lite and United's Shuttle) in an attempt to offer a low-fare product competitive with Southwest's. Fifth, the majority of carriers who have attempted to offer low-fare service have failed (e.g., People Express), and Continental discontinued its Lite experiment after less than one year of unprofitable operation, but Southwest's low-fare service continues to prosper. Sixth, Southwest Airlines has been reported to be a role model for a new generation of start-up airlines (e.g., Western Pacific) attempting to duplicate Southwest's success by offering low-cost service in short-haul markets. Seventh, scores of airport managers and civic leaders have called on Southwest's management in recent years to entice Southwest to commence service in their cities. Finally, insights gained from the study of Southwest Markets might help economists develop a model for explaining behavior in the deregulated airline industry.

* Continental Lite was started in 1993 and rapidly expanded in 1994. However, the Lite experiment was discontinued in 1995 due to losses in excess of $100 million.
The study undertakes an empirical analysis of Southwest to examine the relationship, if any, between Southwest’s competitive presence and market structure, market conduct, and market response. The purpose of studying market structure is to determine the following: (i) whether Southwest Markets are more or less competitive than Non-Southwest Markets as measured by the number of competitors and level of market concentration; (ii) whether Southwest Markets have lower fares than Non-Southwest Markets; and (iii) whether Southwest Markets have higher levels of either passenger demand and market revenues than Non-Southwest Markets. Additional objectives of the empirical analysis of The Southwest Effect include: (i) an examination of whether Southwest’s presence as an effective competitor is correlated with differences in fares, passenger demand or market revenues in markets not served directly by Southwest; and (ii) an update of previous studies of deregulated markets and Southwest, which are described in Chapter Two.
Scope of the research

The empirical analysis of Southwest Airlines is based on the structure-conduct-performance approach to the study of industrial organization, which is described in Chapter Two. This study does not attempt to develop a model of optimal market structure or to predict market conduct, nor does the study evaluate market performance relative to an economic model of conduct. Moreover, the analysis does not attempt to attribute cause and effect. Rather, the study seeks to determine the extent to which Southwest's presence might be related to market structure, conduct or response.

The market structure-conduct-performance approach to the study of industrial organization has been used to draw inferences about the relationships between market structure and conduct, between market structure and performance, and between market conduct and performance. Market structure refers to the characteristics of a market that effect the relationships between buyers and sellers, such as the number of buyers and sellers, the relative market shares of sellers, and the barriers to market
entry. Market conduct refers to the behavior of buyers and sellers in the market, although the focus is typically on seller behavior, such as pricing actions, collusion and cooperation, product innovations and other marketing activities. Market performance refers to how well the market performs relative to the standards of an economic model.

The empirical analysis of Southwest utilizes the market structure-conduct-performance approach to the study of industrial organization as a general framework. However, instead of evaluating market performance, the analysis of The Southwest Effect examines market response, defined as the outcome of the combined behaviors of both sellers and buyers in a market. Market response is measured by total passenger demand and total revenues in a given market. The study of market response should provide insights to airline and airport managers that would not be possible using the conventional structure-conduct-performance approach.
Research hypotheses

The study is based on five general hypotheses and 27 specific hypotheses designed to address the basic research objective. The five general hypotheses and the 27 specific hypotheses are presented in the following discussion. Capitalized terms, such as O&D pdew, Herfindahl-Hirschman Index and Southwest Markets, as well as technical terms, such as weighted average one-way fare, effective competitor and market structure, are defined in the Glossary and discussed in detail in later sections.

Structure of Southwest Markets

The study first seeks to answer two questions regarding the relationship between The Southwest Effect and market structure. First, do Southwest Markets have a different structure than airport-pairs in which Southwest is not an effective competitor? Second, does a change in market structure occur after Southwest’s entry in an airport-pair market? Market structure is measured by the average number of
effective competitors and by the Herfindahl-Hirschman Index.

**General hypothesis one:** The structure of airport-pair markets is correlated with Southwest’s presence.

*Hypothesis 1.1:* In airport-pair markets with comparable lengths of haul and traffic densities, the number of effective competitors tended to be higher in airport-pair markets where Southwest was not an effective competitor in 1993.

*Hypothesis 1.2:* In airport-pair markets with comparable lengths of haul and traffic densities, the level of concentration tended to be lower in airport-pairs where Southwest was not an effective competitor in 1993.

The hypothesized difference in structure between Southwest Markets and Non-Southwest Markets raises an additional question — does market structure change after Southwest enters an airport-pair market? Determining whether market structure changes after Southwest enters is an important research question for two reasons. First, answering the question will determine if Southwest selectively enters markets with a specific market structure. Second,
answering the question will determine if there is a relationship between Southwest's presence and the structure of markets. The following hypotheses pertain to changes in structure in Southwest Markets.

**Hypothesis 1.3:** In Southwest's 1989-1993 New Markets, the number of effective competitors decreased from the year prior to Southwest's entry to 1993.

**Hypothesis 1.4:** In Southwest's 1989-1993 New Markets, the level of concentration increased from the year prior to Southwest's entry to 1993.

To fully analyze market structure in Southwest's New Markets between 1989 and 1993, it is necessary to determine if there were any changes in structure in comparable Non-Southwest Markets during the same time period. The following hypotheses pertain to changes in Non-Southwest Markets.

**Hypothesis 1.5:** Between 1988 and 1993, the number of effective competitors decreased in markets among the top 3,000 airport-pairs where Southwest was not an effective competitor.
Hypothesis 1.6: Between 1988 and 1993, the level of concentration increased in markets among the top 3,000 airport-pairs where Southwest was not an effective competitor.

Conduct in Southwest Markets

The analysis of market conduct attempts to answer two questions. First, do Southwest Markets exhibit a different conduct than airport-pairs in which Southwest is not an effective competitor? Second, does a change in conduct occur after Southwest’s entry in an airport-pair market? Market conduct is measured by the weighted average fare.

General hypothesis two: The conduct of carriers in airport-pair markets is correlated with Southwest’s presence.

Hypothesis 2.1: In airport-pairs with comparable traffic densities and lengths of haul, 1993 average fares in markets where Southwest was not an effective competitor were higher than the average fares in markets where Southwest was an effective competitor.
**Hypothesis 2.2:** In Southwest’s 1989-1993 New Markets, average fares decreased from the year prior to Southwest’s entry to 1993.

To fully analyze market conduct in Southwest’s New Markets between 1989 and 1993, it is necessary to determine if there were any changes in conduct in comparable Non-Southwest Markets during the same time period. The following hypothesis addresses market conduct in Non-Southwest Markets.

**Hypothesis 2.3:** Between 1988 and 1993, the average fare decreased in markets among the top 3,000 airport-pairs where Southwest was not an effective competitor.

**Response in Southwest Markets**

The third part of the analysis is designed to answer two questions regarding the relationship between The Southwest Effect and market response. First, does market response in Southwest Markets differ from market response in airport-pairs in which Southwest is not an effective competitor? Second, does a change in market response
occur after Southwest's entry in an airport-pair?

Market response is measured by the average number of Origin and Destination passengers per day each way (O&D pdew) and the average market revenues per day each.

General hypothesis three: Southwest's presence is correlated with market response.

Hypothesis 3.1: In airport-pairs with comparable traffic densities and lengths of haul, 1993 O&D demand in markets where Southwest was not an effective competitor was lower than O&D demand in markets where Southwest was an effective competitor.

Hypothesis 3.2: In Southwest's 1989-1993 New Markets, average annual O&D demand increased from the year prior to Southwest's entry to 1993.

To fully analyze market response in Southwest's New Markets between 1989 and 1993, it is necessary to determine if there were any changes in response in comparable Non-Southwest Markets during the same time period. The following hypothesis pertains to market conduct in Non-Southwest Markets.
Hypothesis 3.3: Between 1988 and 1993, the O&D demand increased in markets among the top 3,000 airport-pairs where Southwest was not an effective competitor.

The number of Origin and Destination passengers is one variable for analyzing differences in market response. A second variable for analyzing differences and changes in market response is market revenues, which is probably more interesting to airline managers. Accordingly, the following three hypotheses address market response measured by average market revenues per day each way.

Hypothesis 3.4: In airport-pairs with comparable traffic densities and lengths of haul, 1993 market revenues in markets where Southwest was not an effective competitor were lower than market revenues in markets where Southwest was an effective competitor.

Hypothesis 3.5: In Southwest's 1989-1993 New Markets, average annual market revenues rose from the year prior to Southwest's entry to 1993.

Hypothesis 3.6: Between 1988 and 1993, the market revenue decreased in markets among the top 3,000 airport-pairs where Southwest was not an effective competitor.
Conduct in Adjacent Markets

Within the set of markets not served by Southwest, there is a subset of particular interest — the markets adjacent to Southwest airport-pairs. Adjacent Markets are defined as airport-pairs not served by Southwest, but located close enough to an airport served by Southwest that travelers have relatively easy access to both the Southwest Airports and non-Southwest airports. The interest in adjacent airport-pairs is based on anecdotal evidence which suggests Southwest's low-fare service attracts air travelers from nearby communities.

For example, "Southwest does not fly out of Memphis, so 16,000 people paid $24 in 1992 to ride a bus to Little Rock airport that Southwest serves 145 miles away", and "so many Atlantans were forgoing Delta's huge base there and driving 150 miles to Birmingham, Ala. to fly Southwest that an entrepreneur started a van service between the two airports." Atlanta hosts a Delta hub and Memphis is a hub for Northwest, but neither is a Southwest Airport.
Given the significance such travel patterns, if widespread, would have on an airport’s catchment area (thereby affecting revenue from parking, concessions and enplanement charges; and plans for future facility requirements), travel safety (i.e., air travel is much safer than ground transportation and replacing air travel with ground travel will result in higher surface congestion and accident statistics) and competing airlines, the study examines whether The Southwest Effect is correlated with conduct or response in Adjacent Markets.

The study seeks to answer two questions regarding conduct in Adjacent Markets. First, do carriers in Adjacent Markets exhibit conduct that is different from either Southwest Markets or Non-Southwest Markets? Second, does a change occur in the conduct of carriers in Adjacent Markets after Southwest’s entry in an adjacent airport-pair? Market conduct in Adjacent Markets is measured by the weighted average fare.
General hypothesis four: The conduct of carriers in Adjacent Markets is correlated with Southwest's presence in airport-pair markets.

Hypothesis 4.1: In 1993, average fares in Corresponding Southwest Markets were lower than the average fares in their respective Adjacent Markets.

Hypothesis 4.2: In 1993, average fares in Adjacent Markets were lower than the average fares in comparable Non-Southwest Markets.

Hypothesis 4.3: In airport-pairs adjacent to Southwest's 1989-1993 New Markets, 1993 average fares were lower than the average fares in the year prior to Southwest becoming an effective competitor.

To fully analyze market conduct in adjacent airport-pairs between 1989 and 1993, it is necessary to determine if there were any changes in conduct in comparable markets that were neither Southwest Markets nor Adjacent Markets. The following hypothesis pertains to changes in Non-Southwest Markets.

Hypothesis 4.4: Between 1988 and 1993, the average fare decreased in markets among the top 3,000 airport-pairs that were neither Southwest Markets nor Adjacent Markets.
Response in Adjacent Markets

Adjacent Markets are examined to answer two questions regarding market response in airport-pairs not served by Southwest. First, does market response in Adjacent Markets differ from market response in either Southwest Markets or Non-Southwest Markets? Second, does a change occur in market response in Adjacent Markets after Southwest's entry in an airport-pair? Market response in Adjacent Markets is measured by the average number of Origin and Destination passengers per day each way (O&D pdew) and the average market revenues per day each (revenues pdew).

General hypothesis five: Southwest's presence is correlated with market response in Adjacent Markets.

Hypothesis 5.1: In 1993, O&D demand in Corresponding Southwest Markets was higher than the O&D demand in their respective Adjacent Markets.

Hypothesis 5.2: In 1993, O&D demand in Adjacent Markets was higher than the O&D demand in comparable Non-Southwest Markets.
Hypothesis 5.3: In airport-pairs adjacent to Southwest's 1989-1993 New Markets, 1993 O&D demand was higher than the O&D demand in the year prior to Southwest becoming an effective competitor.

To fully analyze market response in Adjacent Markets between 1989 and 1993, it is necessary to determine if there were any changes in response in comparable markets that were neither Southwest Markets nor Adjacent Markets. The following hypothesis addresses market response in Non-Southwest Markets as measured by the level of Origin and Destination passenger (O&D) demand.

Hypothesis 5.4: Between 1988 and 1993, O&D demand increased in markets among the top 3,000 airport-pairs that were neither Southwest Markets nor Adjacent Markets.

The preceding four hypotheses used the average number of Origin and Destination passengers per day each way (O&D pdew) to measure market response in Adjacent Markets. The following four hypotheses are based on average market revenues per day each way as the measure of market response in Adjacent Markets.
Hypothesis 5.5: In 1993, market revenues in Corresponding Southwest Markets were higher than the market revenues in their respective Adjacent Markets.

Hypothesis 5.6: In 1993, market revenues in Adjacent Markets were higher than the market revenues in comparable Non-Southwest Markets.

Hypothesis 5.7: In airport-pairs adjacent to Southwest's 1989-1993 New Markets, 1993 market revenues were higher than market revenues in the year prior to Southwest becoming an effective competitor.

Hypothesis 5.8: Between 1988 and 1993, market revenues increased in markets among the top 3,000 airport-pairs that were neither Southwest Markets nor Adjacent Markets.

Having presented the 27 research hypotheses, the following section describes the methodology used to test each of the hypotheses.
Research methodology

Utilizing data from the U.S. Department of Transportation (D.O.T.), the study examines (i) market structure, measured by the level of concentration and number of effective competitors; (ii) market conduct, measured by average fares; and (iii) market response, measured by passenger demand and market revenues. The data is from the Department of Transportation’s annual "Origin and Destination Survey of Air Passenger Traffic" (O&D Survey) which has been compiled in CD-ROM format and is available from a commercial vendor. Annualized data is used to minimize distortions arising from the highly seasonal nature of many airline markets. The data set consists of the top 3,000 airport-pair markets in the continental U.S. ranked by aggregate market revenues.

The study of The Southwest Effect examines changes in market structure, conduct and response over a five-year period between 1989 and 1993. The decision to focus the analysis on the 1989-1993 time period is based on the following eight considerations:
(i) the 1989-1993 period was characterized by relative stability in domestic economic activity, interest rates, and airline merger activity;

(ii) Southwest achieved status as a Major carrier in 1989 when its annual revenues surpassed $1 billion, and the time period covers Southwest's first five years as a Major;

(iii) by 1989, the industry had accumulated more than a decade of experience with the freedoms of deregulation and appeared to be entering an era of revived competition from new entrant carriers who cited Southwest as their role model;

(iv) between 1989 and 1993, Southwest commenced service at ten airports while other major carriers were cutting back service;

(v) nationwide, passenger demand was relatively stagnant during the entire period, rising less than eight percent nationally between 1989 and 1993, but Southwest's total enplanements increased 106 percent over the same five-year period;

(vi) in 1994, the industry experienced a number of dramatic and unusual developments, such as the launch of Shuttle by United in California and the rapid expansion of Continental Lite in the eastern U.S., and 1994 results are not
included in the analysis due to the unknown impact of these significant developments;

(vii) 1994 results were excluded because Southwest's route network also was undergoing unusual changes due to the integration of operations acquired from Morris Air which resulted in the addition of seven cities to Southwest's route network in 1994, and, as a result, 20 percent of Southwest's 1994 capacity was in new markets; and

(viii) the study is motivated by claims that Southwest is a contributing factor to the industry's severe financial problems, so the analysis covers the industry's downward cycle from a profit in 1989 through the record losses in 1990, 1991 and 1992 to the recovery in 1993.

Limitations and assumptions

The title of the study "An empirical analysis of 'The Southwest Effect'..." implies a cause and effect between the presence of Southwest and market structure, conduct and response. However, the study is not designed to attribute to Southwest the cause of the hypothesized
differences in and changes to market structure, conduct and response. Rather, the title of the present study is drawn from the 1993 Department of Transportation report by Bennett and Craun entitled "The airline deregulation evolution continues, the Southwest effect". However, unlike the Bennett and Craun study which used the results of a correlation analysis to assert Southwest’s presence is the cause of lower fares in the markets Southwest served, the present study utilizes a correlation analysis to determine whether Southwest’s presence appears to be related to differences in market structure, conduct and response.

To explore possible correlation, the study utilizes a commonly-used and widely-accepted data base for airline analyses. Despite the data base’s widespread use, there are, nonetheless, several limitations inherent in the application of the data and the interpretation of the results derived therefrom. For example, the analysis of market response utilizes a comparison of average fares, but Levine (1987) has noted that fare

"competition may not be easily observable to a researcher without access to airline reservations inventories. Much of it [i.e.,
fare competition] may occur by making discount seats more readily available to price-sensitive travelers, while competition for travelers who are not price-sensitive... will be rewarded through extra frequent flyer benefits."

For the study of The Southwest Effect, reservations data is not available, and the analysis of market conduct relies on comparisons of average fares, which is the same database used in many prior studies of the industry.

Another limitation to the use of the data reflects the nature of air travel demand. Many airport-pairs are highly seasonal, therefore the data used in the study utilizes annualized data to smooth out seasonal fluctuations. However, the use of annualized data also results in the understatement of findings in markets Southwest entered during a given year. For example, Southwest entered many new markets during the second or third quarters of a year with special promotional fares to stimulate interest in new service. Consequently, the full year's data does not fully reflect any impact Southwest's entry might have had.
In addition, it is assumed developing a market to its potential requires some time to inform and persuade potential passengers to use the new service. However, no attempt is made to measure or account for the time required to develop brand awareness and acceptance. Moreover, it is assumed each market responds the same to Southwest's entry. No attempt is made to determine the methods Southwest uses to enter a new market or to assess whether Southwest has become more efficient at entering new markets. Similarly, no attempt is made to determine how quickly Southwest became an effective competitor — defined as an airline with at least a 10.00 percent share of market revenues — in its New Markets.

Another limitation to the interpretation of final results is based on the differences between individual markets. For example, market entry probably is affected by barriers such as the availability of airport terminal facilities and slot controls — hourly limits on the number of takeoffs and landings. For example, slot constraints have hampered efforts by new entrants to offer fully-competitive service in several key markets,
"while Midway Airlines has been able to establish a presence in the New York-Chicago market, it has been unable to match the service frequencies offered by its largest competitors [due to slot limitations]. Furthermore, its departures from Washington and New York have been on the fringes of the most desirable times. Significantly, its larger rivals have not considered it necessary to match Midway's low fares in these markets."24

In addition, it is assumed Southwest chooses its markets carefully based on certain characteristics, but no effort is made to identify what market characteristics Southwest considers prior to entry. The assumption of market selection implies the Southwest Market variable is an endogenous variable, which would result in inconsistent and biased estimates of regression coefficients. The issue of endogenous variables is discussed in Chapter Three.

Drawing conclusions regarding a relationship between Southwest's presence and market conduct and response also must be undertaken with due consideration to the vast differences that exist in airport catchment areas. For example, some airports served by Southwest are surrounded by several large metropolitan areas and are within easy driving distance of commercial service airports not served
by Southwest. Other airports served by Southwest have much smaller population bases and are not located near other commercial service airports. Moreover, the data base used in the analysis only shows ticketed airline passengers boarding flights at commercial service airports. Therefore, the data base and the analysis cannot count how many travelers from one city drove to another city to board a Southwest flight.

Southwest is chosen as representative of the low-fare phenomenon which has been cited as contributing to industry's financial problems. However it is not known, nor assumed, if the presence of other low-fare carriers, whether they be start-ups (e.g., Kiwi, Reno, ValuJet or Western Pacific) or subsidiaries of established carriers (i.e., Continental Lite or Shuttle by United), has been or will be correlated with market structure, conduct or response. Therefore, extending findings from the analyses of Southwest's low-fare markets to other markets dominated by low-fare carriers is deemed beyond the scope of the study.
The study focuses on a limited set of market variables and does not take into account likely differences in a variety of other key variables of buyer and seller behavior such as: (i) consumer preferences for specific airports, timing of flight schedules, frequency of service, or flight routing; (ii) consumer preferences regarding ticketing procedures and frequent flyer programs or (iii) airline operating practices, such as interlining, code-sharing, travel agent commission overrides, or participation in computer reservation systems. For example, do passengers choose one airline over another because they want to fly to Midway or Hobby rather than O'Hare or Intercontinental? In addition, it is assumed that (i) passengers prefer nonstop flights to connecting flights; and (ii) the frequency of service is highly correlated with market share. However, no attempt is made to adjust for differences in these market variables.

Establishing a relationship between the presence of a low-fare competitor and structural changes in market structure, conduct or response is complicated by the realization that general economic conditions such as inflation rates, unemployment rates, and costs of other
travel components (e.g., rental cars, hotels and meals) probably influenced airline passengers' sensitivity to fares during the time-period used in the study. Therefore, a low-fare carrier might have even more appeal during cyclical periods of heightened price consciousness. No attempt is made to measure any changes which might have occurred in passengers' sensitivity to airline fares due to changes in overall economic conditions. Similarly, during the Gulf War crisis, international travel demand was sharply curtailed due to passenger concerns regarding terrorist attacks. It is possible passenger concerns about international travel also affected domestic travel demand, although the direction or the degree of the impact remain unknown.

The analyses of market response measures market revenues rather than carrier profits due to the many difficulties of assigning costs to specific flights. Cost allocation presents a problem in several areas, including: (i) domestic versus international passengers; (ii) cargo versus passenger operations; (iv) passengers traveling over different routings (i.e., nonstop, multiple-stop direct, and connecting); and (iv) airport-specific costs
(e.g., local labor, airport landing fees and terminal rentals, and ground handling equipment). Given the aforementioned difficulties, the study does not attempt to assign costs to specific markets.

Contributions

The research findings from this study are expected to result in four key contributions. First, this study provides an update of prior studies of airline market structure and conduct that were prepared before Southwest became a Major carrier, or, in case of prior studies of Southwest, that were limited in the scope of their analysis. A discussion of the prior studies is provided in Chapter Two. Second, the study provides a rigorous and objective assessment of claims that Southwest's low-fare service is correlated with structural changes in the deregulated airline industry. Third, the study's results will confirm or refute government concerns that Southwest is dominating markets and using the resultant market power to raise fares. Finally, the study undertakes an examination of the relationship between Southwest's
presence as an effective competitor and the structure, conduct and response of Adjacent Markets not directly served by Southwest.

The study is designed to be of interest to a wide variety of key aviation constituencies — passengers, airline employees, airport managers, airline managers, public policy makers, and manufacturers and providers of airline capital.

In markets served by Southwest, anecdotal evidence suggests that passengers receive high levels of service, but pay fares that are significantly lower than fares on other major carriers. For example, Morten Beyer and Associates (1993)\(^2\) stated that if other airlines had charged the same low fares offered by Southwest, the American public would have saved $20 billion per year in air fares. The present study of The Southwest Effect examines the extent to which Southwest's presence is correlated with lower fares, thereby making air travel affordable for more passengers. The availability of low fares makes air travel viable for consumers who otherwise would not travel due to budget or time constraints. In
addition, lower fares entice travelers to fly rather than drive, and air travel statistically is much safer than travel in a private automobile.

Airline employees will be interested in the study's findings because employees have been affected by the restructuring programs which managers claim are needed to meet the low-fare competition. The need for more research is evident by recent actions of Delta's pilots who

"were meeting with Delta executives to review details of the union's offer to forego a two percent pay increase scheduled to take effect August 1. The pilot's group had offered to postpone that increase if the carrier used the resulting savings, estimated by ALPA at $26 million, to acquire three additional Boeing 737s and mount new service to compete with low-cost, short-haul carriers that have afflicted Delta and other airlines."

Similarly, "American's pilots [have] urge[d] a shift toward the Southwest model." 27 The study examines in

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* In December 1995, Delta announced it had reached a tentative agreement with its pilots union that would lead to the 1996 launch of a low-fare, short-haul operation to compete with no-frills carriers. SOURCE: Quintanilla, C., "New Delta service targets small rivals, but USAir may get caught in the crossfire", Wall Street Journal, December 12, 1995, page A13.
detail The Southwest Effect and the findings will provide airline employees with additional insights.

A third constituency to benefit from the analysis of Southwest's impact on the industry is airport managers. Deregulation has greatly complicated airline relations and long-term planning for airport managers who have: (i) had carriers add and withdraw service with little or no advance notice; (ii) had to re-negotiate airport use agreements that are more flexible but lack long-term carrier commitments; and (iii) been pressured by communities to develop marketing programs to improve air service as an economic development tool.

Anecdotal evidence has suggested that the introduction of service by Southwest appears to have an impact on airport operations by expanding an airport's catchment area due to stimulation from both local residents and from passengers living in surrounding communities. For example, "Oakland International Airport, the main base of Southwest's Northern California operation, is the fastest growing of California's ten major airports." In addition, it was
noted earlier in the chapter Atlantans have been driving to Birmingham, and Memphis passengers have been busing to Little Rock. Little Rock and Birmingham are Southwest Airports. Neither Atlanta nor Memphis is a Southwest Airport, but each is a hub for an other major carrier.

Not surprisingly, Southwest has attracted the attention of many airport marketing efforts. In 1990, 34 cities formally petitioned Southwest to start service at their airports, and by 1991 the number had grown to 51 requests. By 1994, "typically, over 100 requests a year [were coming] in from city fathers, begging the airline to serve their locations." Specific examples of efforts to lure Southwest include the following:

"Rep. Dan Glickman, D-Kan, so badly wants Southwest to service his Wichita constituents that he introduced legislation to repeal the Wright Amendment... [which] prohibits airlines from flying between [Dallas'] Love Field and anywhere beyond Texas and its four bordering states without making passengers change planes... [and] Mitchell International Airport in Milwaukee... built, carpeted and painted a gate area to exact Southwest Airlines specifications [in 1990] hoping to win consideration. Southwest has yet to come... [and] says it declines all incentives from anyone."
The study of The Southwest Effect seeks to determine if there is a relationship between Southwest’s presence and market fares and market demand, thereby providing insights for airport executives who are developing air service proposals to attract Southwest to their airports.

A fourth constituency to benefit from the study is managers of incumbent airlines attempting to compete with Southwest and managers of new entrant carriers who look to Southwest’s success as a role model for their own operations. For example, “short-haul markets account for more than one-third of total domestic passengers. It is unlikely that ... American, Delta and United will simply give up such a large market segment” \(^32\) to Southwest or any other carrier without a significant battle. In addition, "the challenge of Southwest also may contain long-term opportunities. Southwest has shown where growth may be found in a stagnant economy. Facing the possibility that the U.S. airline market is maturing, an appealing prospect is that the task of meeting a competitive threat also brings new growth opportunities." \(^33\)
A fifth constituency to benefit from the study is public policy makers. They are concerned about the long-term implications of major changes in the structure and conduct of airline markets. A recent study of The Southwest Effect by the U.S. Department of Transportation concluded that the

"inability of existing airlines to compete with Southwest's much lower costs creates an even greater need for the government to encourage low-cost, new entry, as a discipline for Southwest's pricing in the future, and to replace service of other major airlines that are scaling back service or exiting markets dominated by Southwest."34

Southwest's growth also presents another policy concern — survival of the latest generation of new entrant carriers. On the one hand, Southwest's success has been a role model for many new entrants, and made it easier for them to attract start-up capital. On the other hand,

"ValuJet has proven recent start-ups can hold their own against the marketing power of the majors, but if Southwest continues to expand its presence in the eastern United States, then Southwest could begin to target some of the markets already occupied by the new entrants." 35

Indeed, Southwest's chief operating officer has conceded

"because there is [new low-fare competition], it just
makes it more imperative that we expand into some places and get there first."

Southwest began serving Florida markets in January 1996.

A final constituency interested in the study's findings is the manufacturers and the providers of airline capital.

"[Unlike] most big U.S. carriers scrambling to reduce the size of their fleets and to cancel or defer orders... Southwest has not had to cancel or defer delivery of a single aircraft... [and] the airline recently placed another big 737-300 order for more than 30 aircraft to fuel its growth later in the 1990s."

In fact, Southwest was the launch customer for the Boeing 737-300 model in 1981 and Boeing's 737-500 model in 1990 and will be the first carrier to operate the 737-700 model when deliveries begin in 1997.

Given the failures of major carriers such as Eastern and Pan Am, the Chapter 11 experiences of major carriers such as Continental and TWA, and the high failure rate of new entrant carriers, providers of capital are understandably interested in the future structure of the airline industry. However, Levine (1987) noted that "lenders have only a limited understanding of how airlines compete in a
still-evolving competitive market and so find it
difficult to assess risk." The study of The Southwest
Effect provides additional insights for airline credit
analysts.

The study also contributes to the literature on airline
deregulation by providing a detailed market analysis.
Rather than using national market share statistics whose
average distorts wide variations in market shares at
individual airports and in specific passenger markets, the
study looks at the changes that have occurred at the
airport-pair market level. In addition, the present study
differs from previous industry-level studies which have
tended to focus on one of three issues. One research
stream has focused on whether airline fares approximate
competitive-prices. A second major research stream has
focused on whether the airline industry met the conditions
of a "contestable market". A third research stream has
focused on market concentration at airline hubs and its
impact on fares. The empirical analysis of Southwest is
closest in nature to the third stream, but focuses not on
airline hubs but on markets served by Southwest.
The research also is different from prior studies of Southwest. For example, the Department of Transportation's study of Southwest focused on market structure and conduct in the intra-California market, but such a limited geographic focus raises issues about the generalization of findings to other markets. Therefore, the present research expands the analysis beyond California markets to examine the possibility of a broader geographical relationship between Southwest's presence and market structure, conduct or response.

Moreover, unlike prior studies which concluded Southwest's presence was the cause of the observed changes in market structure, conduct or response, the present study only examines whether a relationship exists between Southwest's presence and structure, conduct or response. The objective of the present study is consistent with methods used in the analyses, which are not appropriate for attributing cause and effect.

The present research adds to the understanding of Southwest by examining market variables not used in prior
studies. For example, the Department of Transportation's study did not explicitly question if Southwest's market domination was correlated with market conduct over time. The empirical analysis of Southwest tracks market fares to determine if Southwest has, and uses, market power to raise prices after driving competitors from the market as claimed in the D.O.T. study.

Findings from the study also should provide useful insights to economists struggling to apply an economic model to the deregulated airline industry. To date, economists have failed to identify an appropriate model describing the deregulated airline industry, and the failure may be due to the continuing evolution of the industry. For example, Bailey, Graham and Kaplan concluded in 1985 that "there was strong awareness that the air transport industry was in transition and therefore formal models had limited usefulness in guiding policies ... [and] the conception of what the proper long-run economic model should look like has been changing as more
is learned about the competitive behavior of the industry."^{39}

**Organization of the research**

The remainder of the study is divided into four chapters. Chapter Two reviews the literature regarding the market structure-conduct-performance approach to industry analysis. The second chapter also includes a summary of airline industry studies of (i) market structure and conduct and (ii) Southwest Airlines. Chapter Three discusses the methodology used to test each research hypothesis. Also in Chapter Three are discussions of data sources and collection methods. Chapter Four discusses in detail the findings of the research. Chapter Five summarizes the research study, discusses the public policy and managerial implications of the research findings, and offers suggestions for further research.

Following Chapter Five are a glossary of key terms and two Appendices. Appendix A lists the airports served by
Southwest at yearend 1993. Appendix B provides a technical note on the O&D Survey data used in the analysis.
CHAPTER II: REVIEW OF THE LITERATURE

Introduction

Chapter One presented the problem, outlined the research questions and objectives, introduced the general research propositions, summarized the general methodology used in this study, and discussed the study's scope, limitations and contributions. Chapter Two reviews the literature on prior airline studies in general and on Southwest in particular. The remainder of the chapter is divided into five sections. Section one summarizes the deregulation experience. Section two reviews research relevant to the methodology used to conduct this study. Section three discusses research on the structure of and conduct in deregulated airline markets. Section four provides a history of Southwest and an analysis of its competitive advantages. Section five contains a discussion of how the prior research contributes to this study.
Evolution from regulation to deregulation

The discussion of the industry's evolution is broken into four parts. Part One briefly summarizes the major elements and the legacy of the Civil Aeronautics Board's (C.A.B.) regulation of interstate aviation and the developments leading up to airline deregulation. Part Two, entitled the People Express Era, discusses the major developments affecting airline competition in the years immediately following deregulation. Part Three, entitled the Mega-Carrier Era, describes a period of relative prosperity for the industry. Part Four, entitled the Southwest Era, discusses the industry's recent experiences.

The C.A.B. era (1938-1978):

The airline industry was brought under the protective mantle of the Civil Aeronautics Board in 1938. Under the tight regulatory control of the C.A.B., airline pricing generally was mileage-based, although the C.A.B.'s fare formula did provide for cross-subsidized service. In many
of the longer-haul and higher density markets, C.A.B. fares were set above prevailing costs to cross-subsidize service on shorter-haul, lower-density routes where fares were often set below prevailing costs.

The C.A.B. had no fare jurisdiction over carriers operating entirely within one state. Such intra-state carriers were under the jurisdiction of their state’s public utilities commission. As a result, intra-state carriers, such as Pacific Southwest Airlines (PSA) in California and Southwest Airlines in Texas, offered fares that were less than half those offered by the C.A.B. certificated airlines. Moreover, the low-priced intrastate carriers generally were relatively profitable.

The Airline Deregulation Act of 1978 ended the C.A.B.'s authority over routes on December 31, 1981, domestic fares on December 31, 1983 and called for the end of the C.A.B. itself on December 31, 1985. However, by mid-1979, the C.A.B. routinely was granting all domestic route applications and approving virtually all fare requests within a wide zone.
During the final decade of the C.A.B. era, the industry's revenues increased an average of 19 percent per year, the operating profit margin averaged 3.5 percent per year, and the industry reported a net loss in only two of the ten years.

The People Express era (1979-1986)

In the years immediately following airline deregulation, the industry entered a period of intensified competition as incumbents expanded into new inter-state routes and as additional competition was introduced by new entrant carriers. Between 1978 and 1984, the number of carriers reporting to the C.A.B. more than doubled from 43 to 87. Included in this definition were former supplemental (i.e., charter) and intra-state airlines.

Many of the new entrants adopted low-fare strategies, and initially they were successful in attracting significant numbers of passengers. The low fares introduced by the new entrants captured passengers from the incumbents whose costs and fares were much higher. The low fares also
stimulated demand among passengers who would otherwise not have traveled or would have taken ground transportation. In the first seven years of deregulation, the number of revenue passenger miles almost doubled, and the share of the total traffic of the incumbent trunk airlines declined.

However, intense fare wars resulted from the incumbents’ battles to capture market share from each other and from the new low-cost carriers’ efforts to attract passengers. Brenner, Leet and Schott (1985) concluded that the initial tendency to blame post-deregulation financial problems on factors such as the jump in fuel prices, the recession, and the air traffic controllers strike were overly simplistic. The larger contributing factor was the degree to which the airlines engaged in uneconomic pricing strategies. The incumbent carriers initially adopted the attitude that they would lose less by matching the unprofitable fares introduced by the new entrants and minimize the traffic loss. Incumbents’ efforts to collect fares based on their higher costs resulted in severe traffic erosion to the lower-priced new entrants, and the
 incumbent was left operating a schedule with very low load factors.

It was widely believed at the time that this was the expected course deregulation would take — the incumbent carriers would fall victim to the aggressive new entrants. The incumbent carriers were burdened with fleets, work rules, management skills and cost structures built up during forty years of government oversight and were ill-equipped for the challenges of free-market competition. It was widely believed the low-cost new entrant carriers would bring to the marketplace innovative price and product options, lower-costs and lower fares, thereby forcing the incumbents either to radically restructure or to leave the marketplace. People Express, the embodiment of deregulation proponents’ expectations, initially prospered according to this scenario, while Braniff became the first large carrier to go bankrupt in decades and earned the distinction of being the first incumbent casualty of deregulation.

Brenner, Leet and Schott (1985) concluded that the highly publicized fare wars raised a fundamental question of
whether the industry can, over an extended period, maintain economic pricing in a free market. However, by the mid-1980s, many of the incumbents had learned how to respond to the threat of the new entrants. By yearend 1986, People Express, and nearly all of the other new entrants, had ceased to exist. For many of the large incumbents, the war appeared to have been won, and the industry was poised to enter a brief period of relative prosperity.

During the People Express Era, the industry’s revenues increased an average of 12 percent per year, the industry’s operating margin averaged only 1.0 percent per year, and the industry reported a net loss in four of the eight years.

_The Mega-Carrier era (1987-1989)_

By 1987, virtually all new entrants had either failed or merged with larger incumbents. Moreover, the number of new entrant applications dropped sharply as start-up capital became increasingly scarce. Not surprisingly,
studies were beginning to show that passenger fares had begun to rise from the lows reached during the height of the People Express Era. Levine (1987) and Evans and Kessides (1993a), among others, were puzzled by the failure of the new entrants.

At the time, it appeared the incumbents had entered deregulation with a variety of handicaps, but the high-cost inefficient incumbents survived and the low-cost, innovative new entrants failed because the managers at the incumbent carriers developed innovative marketing programs to overcome their disadvantaged cost structures. Post-deregulation initiatives by incumbent carriers can be divided into four general categories:

(i) network restructuring — route expansion and development of hub-and-spoke networks;

(ii) new affiliations — mergers and code-sharing agreements;

(iii) financial restructuring — increased leverage and imposition of tighter cost controls; and
(iv) re-prioritization of marketing strategies — frequent flyer programs, competitive pricing via revenue management programs, and greater attention to distribution via computer reservations systems and travel agent compensation.

During the Mega-Carrier Era, the industry underwent a major consolidation phase as a number of significant mergers were consummated. Three major carriers — Piedmont, Republic and Western — were acquired by three other major carriers — USAir, Northwest and Delta, respectively, which reduced the number of major carriers. As the number of major carriers in operation declined, the market shares of the remaining carriers increased, raising concerns about market concentration and the loss of competitiveness.

By 1991, analysts such as Sorenson (1991) were beginning to conclude that the competitive discipline created by low-cost new entrant airlines had largely been removed from the industry, and competition would likely enter a phase where pricing would be subordinated to other
competitive tools. Indeed, during the three years of the Mega-Carrier Era, the industry's revenues increased an average of 11 percent per year, the industry's operating margin averaged 4.1 percent per year, and the industry was profitable all three years.

The Southwest era (1990-Present)

In a 1993 study of Southwest Airlines conducted by the U.S. Department of Transportation, Bennett and Craun (1993) concluded that

"the principal driving force behind dramatic fundamental changes that have occurred and will occur in the U.S. airline industry over the next few years is the dramatic growth of low-cost Southwest Airlines... Other major airlines are giving up competing with Southwest's low-cost service for market share."

Moreover, Bennett and Craun also linked the industry's losses in the first part of the 1990s to Southwest's competitive presence. The authors attributed the industry's record profits in 1988 to significant increases in short-haul fares which more than offset declines in
long-haul fares. However, Southwest's growing presence in short-haul markets had been a factor in the industry's financial performance thereafter, and the Bennett and Craun asserted that had all traffic moved at the higher fares that existed before Southwest entered, "domestic industry revenues would have been more than $2.5 to $3.0 billion higher in 1992." Another indication of Southwest's growth and influence was given in Avmark (1993) which reported that Southwest either controlled or strongly affected the prices paid by passengers in more than 60 percent of the largest passenger markets.

Southwest's alleged influence appears to be inconsistent with the relatively small scale of its operations. In 1994, Southwest accounted for only 3.8 percent of the industry's total revenue passenger miles and only 2.8 percent industry revenues. However, one strong indication of Southwest's importance is the stark contrast between its financial performance during the 1990s and the financial performance of the other major carriers during the same time period.
Table 3 shows annual net profits for four major airlines\textsuperscript{43}. Profits from American, Delta and United are from domestic operations only to be compatible with Southwest which has no international flights.

\begin{center}
\begin{tabular}{|c|c|c|c|c|}
\hline
\textbf{Year} & \textbf{American} & \textbf{Delta} & \textbf{Southwest} & \textbf{United} \\
\hline
1994 & $11,265$ & $(42,374)$ & $179,331$ & $20,216$ \\
1993 & $(59,648)$ & $158,115$ & $149,814$ & $29,555$ \\
1992 & $(400,057)$ & $(138,640)$ & $91,020$ & $(268,878)$ \\
1991 & $(128,520)$ & $(150,347)$ & $26,919$ & $(278,824)$ \\
1990 & $(39,682)$ & $(118,967)$ & $47,083$ & $72,875$ \\
\hline
\textbf{Totals} & $(616,642)$ & $(342,213)$ & $494,167$ & $(425,056)$ \\
\hline
\end{tabular}
\end{center}

Between 1990 and 1994, the domestic operations of the three largest U.S. airlines — American, Delta and United — clearly produced unsustainable financial results. Among the major U.S. airlines offering scheduled passenger service, only Southwest was able to produce a net profit each year between 1990 and 1994. Southwest's strategy was profitable. By comparison, the strategies of the incumbents — notably American, Delta and United — that had worked well against the first generation of new
entrants, were, by the incumbents' own admissions, relatively ineffective against the second generation of low-fare new entrant carriers, such as Southwest.

As a result, analysts such as Nocella (1993) concluded that while the industry was still "dominated by a few large carriers, the competitive dynamics of the industry are changing. Most importantly the stable domestic pricing environment desired by the U.S. majors is not likely to occur due to the expansion of new low-cost, low-fare carriers. The role model is Southwest."  
Southwest's success has spawned a rush of applications by new entrants, and even some incumbent carriers — notably Continental and United — have attempted to operate low-fare operations based on the Southwest model.

During the Southwest Era, industry revenues increased an average of only 3.3 percent per year, the industry's operating margin averaged a negative 1.6 percent, and the industry recorded a huge net loss in each of the four years.
Summary of the industry's evolution

Levine (1987)\textsuperscript{45} noted that some developments predicted of deregulation did not emerge, such as simple fare structures based on the low-costs of new entrants. He also noted many things happened that were not predicted, such as the development of hub-and-spoke route networks, computer reservations systems, complex fare structures based on revenue management programs, frequent flyer programs, and the survival of higher-cost incumbent airlines. Similarly, the Transportation Research Board (1991) concluded that

"looking backward from 1984, when many of the early studies were completed, it could be seen that many new airlines had entered the industry, competition was intense, and fares were falling. The optimism of these early evaluations must be tempered by subsequent events. Looking backward from 1991, it can be seen that the industry has become more concentrated with the largest airlines holding a larger share of passenger traffic than they had at the outset of deregulation."\textsuperscript{46}

Looking back from 1995, it can be seen that the industry is still changing, which raises a question of vital interest to consumers, airline managers and policy makers.
Is the growth of Southwest representative of the coming of the low-fare competitive market structure predicted by Levine and other proponents of deregulation? Evidence suggests Southwest's success has led to a new generation of startup carriers attempting to, at varying degrees, duplicate the Southwest model. Moreover, major incumbents who survived the first round of new entrants, are now undertaking drastic restructurings and, in some cases, even imitating Southwest's low-fare service. The study seeks to provide some answers to the question of whether Southwest represents the model of a post-deregulation, low-fare competitor.

Market structure, conduct and response

The basic framework for the analysis of The Southwest Effect is the market structure-conduct-performance approach to industrial organization. Bain (1968) has been credited with developing the application of the approach for the study of specific industries.
Bain's primary use of the approach was to study market performance, which he defined as the composite end result of firms' competitive behavior in an industry. His definition of market performance, included, among other things, the following elements: (i) the technical production efficiency of plants and firms in the industry; (ii) the relationship of market price to the long-run marginal and long-run average costs of production; (iii) the actual level of industry output relative to an optimal level based on price and long-run marginal cost; and (iv) the relationship between sales-promotion costs and the costs of production. Bain assumed market performance was related to the structure and conduct of firms within the market. Therefore, he felt the role of the analyst was to study both market conduct and structure and to draw inferences regarding the relationships between structure and performance and between conduct and performance.

Bain defined market structure as the characteristics of a market that have an important influence on the nature of competition and pricing within the market. Bain's definition of market structure, included, among other things, the following elements: (i) the number and size
distributions of sellers; (ii) the degree of buyer concentration; (iii) the degree of product differentiation; and (iv) the relative ease with which new sellers could enter the market.

Bain defined market conduct as the patterns of behavior firms use to adapt to the markets in which they operate. His definition encompassed mainly: (i) the price policies of firms, and (ii) the interaction and coordination of the policies of competitors in the market.

Bain argued that, from a public policy perspective, market performance is most important. However, Bain believed "direct regulation of performance (such as direct determination of price and output by a government commission) is not a generally workable means of regulating a free-enterprise economy. On the other hand, regulation of market structure and conduct is a much more feasible and, in general, constitutes a workable mode of regulation. Then the feasible regulatory procedure aimed at securing satisfactory performance is to devise regulations which will secure market structures and patterns of market conduct which will lead to satisfactory performance." 47
Therefore, the study examines market structure and conduct in an attempt to provide insights for policy makers concerned about the performance of deregulated airline markets.

A basic issue associated with the market structure-conduct-performance approach is the proper definition of the market to be studied. Van Acker (1991) defined "a market in air transportation as all the customers who want to travel from a specific origin area to a destination area, and of all the airlines that provide transportation from that origin area to that destination area." 48

Borenstein (1989) also addressed market definition and concluded that the question is whether flights to different airports in the same metropolitan area compete with one another. For example, do flights from Kennedy airport to Detroit effectively discipline prices on the La Guardia to Detroit flights? Borenstein treats each metropolitan airport as a separate market, but notes the "degree of actual substitutability remains for future work." 49 The General Accounting Office (1991) analysis
was done on both an airport-pair and city-pair level, with no significant difference in reported results.

**Market structure**

There are three basic issues associated with the study of market structure. First, identification of the significant characteristics of market structure. Second, identification of the appropriate variables for measuring the desired characteristic(s). Third, identification of the significant levels of each variable.

The first issue is determining the most significant characteristics of market structure. Bain cited, among other characteristics, the number and size distribution of sellers and the barriers to market entry. Curry and George (1983) concluded that seller concentration is a significant dimension of market structure because it plays an important part in determining market power and, in turn, market conduct and performance. In their study of the airline industry, Hurdle et al. (1989) concluded that the most powerful explanatory variables of market
structure were measures of seller concentration that incorporate the number and size distribution of firms in the market. Levine (1987), among others, has examined the post-deregulation barriers to market entry.

The second issue associated with an analysis of market structure is the identification of the appropriate variables for measuring the characteristics of market structure. Carlton and Perloff (1994) noted that industry concentration is typically measured as a function of the market shares of some or all firms in a market. One measure is the $n$-firm concentration ratio, the aggregate market shares of the $n$-largest firms. The drawback of this measure is the arbitrary assignment of $n$.

Another measure of market concentration is the Herfindahl-Hirschman Index, the sum of the squared market shares of all firms in the market. A market with three equally-sized competitors would have a Herfindahl-Hirschman Index of $0.33333 \times ((0.333)^2 + (0.333)^2 + (0.333)^2)$; whereas, in a market in which two fringe-firms each with a ten percent share competed with a dominant firm with an eighty percent share, the Herfindahl-Hirschman Index would be $0.65000$.
\((0.10)^2 + (0.10)^2 + (0.80)^2\). The Herfindahl-Hirschman Index provides a guideline of the relative concentration of market shares — the closer the Herfindahl-Hirschman Index is to 1.0000, the greater the concentration of market share in a single firm.

Another common measure of market structure is the number of effective competitors in the market, which requires an arbitrary assumption regarding the appropriate value for defining an effective competitor. Prior studies of airline market structure have used a variety of measures and values to define an effective competitor. For example, Reiss and Spiller (1989), Whinston and Collins (1992), and Hurdle et al. (1989), among others, limited the definition of competitor to any airline(s) offering direct service in the market. Other studies have used market shares as the basis for defining competitors. For example, Belobaba and Van Acker (1994) assumed an airline with a five percent share of the passengers was an effective competitor. Taneja (1981)\(^2\), the U.S. Department of Transportation (1990) and Borenstein (1989) defined an effective competitor as having at least a 10.00 percent market share.
Market studies based on effective competitors or the Herfindahl-Hirschman Index must first identify what variable to use for calculating market shares which in turn is used to compute the Herfindahl-Hirschman Index and to identify effective competitors. The Department of Transportation (1990) used two traditional measures of market structure — available seat capacity and share of Origin and Destination (O&D) passengers. Most studies have measured competitors based on their share of demand (i.e., passengers) rather than capacity. The empirical analysis of The Southwest Effect used a third variable — market revenues — to determine the market shares used for computing the Herfindahl-Hirschman Index and the identification of effective competitors. Justification for the use of market revenues was based on the desire to minimize the impact of non-revenue passengers in the sample, and to focus on the markets that were most important to the airline managers — those markets that generated significant levels of revenues. Accordingly, in the analysis an effective competitor was defined as an
airline with at least a 10.00 percent share of market revenues.

The third issue related to market structure is identification of significant levels for the chosen variables. Effective competitors were defined to have at least a 10.00 percent share of market revenues. The study also computes the Herfindahl-Hirschman Index in markets, but does not attempt to classify markets as concentrated or unconcentrated based on the values of the computed Herfindahl-Hirschman Index. Rather, the study compares concentration levels in groups of markets, such as Southwest Markets versus Non-Southwest Markets and Adjacent Markets versus Non-Southwest Markets. Consequently, no attempt has been made to determine the appropriate values for classifying market concentration based on the Herfindahl-Hirschman Index.
Market conduct

Conduct is broadly defined to encompass all behavior of firms competing in a market, including price and product policies, promotion strategies, and the degree of cooperation. All have important managerial implications, but the area of most interest in this study is pricing policy. Price can be measured as the average fare paid by passengers or as yield, a mileage-adjusted measurement of price.

The Department of Transportation's 1990 study reported that the relationship between fares and yields is constant and the findings apply equally to both fares and yields. Therefore, the empirical analysis of The Southwest Effect used average fares. However, market data is stratified into length of haul categories to minimize the differences in fares attributed to distance alone.
Market response

Bain's market structure-conduct-performance approach generally assumes the analyst is primarily interested in measuring market performance relative to a social optimum. In most economic models, the social optimum is defined as a function of costs. Given the difficulty of assigning market costs in the airline industry, the empirical analysis of The Southwest Effect does not attempt to evaluate market performance relative to an economic model of optimality. Rather, the analysis focuses on the response of individual markets to the conduct of firms competing in the market. Market response is measured by the level of and changes in passenger demand and by the level of and changes in aggregate revenues collected by all carriers in the market.
Structure and conduct in deregulated airline markets

Given the wealth of airline industry data still collected and published by the federal government and the research interest in the industry's transition from regulation to deregulation, there have been numerous studies undertaken examining the structure of and conduct in deregulated airline markets.

Studies of structure in deregulated airline markets

Studies of deregulated airline markets typically have focused either on structure at the national level or, more commonly, market structure at the local market level.

Market structure at the national level

Bailey, Graham and Kaplan (1985) observed that the airline industry tends to be highly concentrated relative to other industries. Borenstein (1992) showed the industry became less concentrated at the national level between 1977 and
1982, but the overall degree of concentration at the national level increased significantly thereafter and was higher in 1990 than in 1977.

Table 4 shows changes in airline concentration at the national level between 1977 and 1990.

Table 4  Measures of Airline Concentration

<table>
<thead>
<tr>
<th>Concentration Measure *</th>
<th>1977</th>
<th>1982</th>
<th>1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-firm concentration ratio</td>
<td>56.2%</td>
<td>54.2%</td>
<td>61.5%</td>
</tr>
<tr>
<td>8-firm concentration ratio</td>
<td>81.1%</td>
<td>80.4%</td>
<td>90.5%</td>
</tr>
<tr>
<td>Herfindahl-Hirschman Index</td>
<td>0.106</td>
<td>0.093</td>
<td>0.121</td>
</tr>
</tbody>
</table>

* Based on total domestic Revenue Passenger Miles

Market structure at the local level

Most studies of airline market structure have focused on changes in individual airline markets. For example, Bailey, Graham and Kaplan (1985) found that the average number of airlines providing nonstop service had increased on both short-haul and long-haul routes, although the average increase was small — less than one additional
carrier per route. Moreover, short-haul routes tended to have fewer competitors than long-haul routes.

Brenner, Leet, and Schott (1985) concluded that deregulation changed the industry's structure far more than predicted. Very few of the routes they studied had the same mix of carriers they had prior to deregulation. Moreover, carriers grew at different rates, thereby changing market shares. However, while the degree of dominance of the former trunk lines had been reduced, the few largest airlines still dominated the industry.

Morrison and Winston (1986) developed a model to calculate the optimal number of carriers in a particular city-pair market. They found that differences between the actual and optimal number of competitors were directly related to traffic density on route. On the densest routes, the difference between the actual and optimal number of competitors was small. However, as traffic density decreased, the difference between the actual number and the optimal number of competitors widened.
Morrison and Winston (1990) later found that the number of effective competitors (measured by the inverse of the Herfindahl-Hirschman Index) had risen from 1.52 to 1.90 between 1978 and 1988, and that the percentage of travelers flying on carriers with 90 percent or greater market shares had fallen from 28 percent in 1978 to 17 percent in 1988.

Brander and Zhang (1990) assessed competitiveness in a set of 33 city-pairs and concluded that airline market structure fit an oligopolistic model, thereby supporting the argument that airline markets are not conducive to large numbers of competitors.

The Department of Transportation (1990) study found that between 1979 and 1988, the number monopoly markets (city-pairs served by only one carrier offering single-plane service) declined 11.7 percent between 1979 and 1988, and the number of markets with two or more competitors increased 25.7 percent. The Department of Transportation (1990) concluded that at the national level, the industry was more concentrated than in 1978, but in city-pair markets, seller concentration had declined.
The Transportation Research Board (1991) found that 40 percent of the city-pairs had three or more effective competitors (airlines with at least a 10.0 percent share of the passengers) in the year ended June 1989, up from only 20 percent of the markets in 1979, but down from 53 percent of the markets in 1984. The Transportation Research Board (1991) concluded that market distance was the single most important determinant of the level of market structure. The Transportation Research Board (1991) also found that 74 percent of the long-haul markets were served by three or more carriers, but 45 percent of the short-haul markets were dominated by one carrier. Moreover, as market distance increased, competition tended to increase irrespective of market density.

Evans and Kessides (1993a)\(^5\) and (1993b)\(^6\) determined that the weighted average Herfindahl-Hirschman Index on all routes dropped every year between 1978 and 1985 from a high of 0.646 in the fourth quarter of 1978 to a low of 0.407 in the fourth quarter of 1985. However, between 1985 and 1988, the weighted average Herfindahl-Hirschman Index, began to increase — 0.407 in 1985-iv to 0.441 in
1988-iv. Evans and Kessides (1993:a) computed the number of effective competitors, defined as inverse of the Herfindahl-Hirschman Index, and found that between 1978 and 1988, the average number of effective competitors per route increased from 1.5 airlines to 2.5 airlines. In the fourth quarter of 1988, the dominant airline in the 1,000 largest routes carried, on average, 57 percent of the traffic, while the second largest carrier accounted for 25 percent, down slightly from 65 percent and 23 percent, respectively in the fourth quarter of 1978.

The studies just cited have concluded the level of market concentration has been decreasing. However, two later studies present somewhat contradictory findings. Borenstein (1992) concluded that seller concentration measured by the Herfindahl-Hirschman Index in all city-pair markets decreased between 1984 and 1990. However, he also reported that if the sample is limited to only trips where the passenger does not change planes, the level of seller concentration steadily increased from 1984 to 1990.

Belobaba and Van Acker (1994)\textsuperscript{59} concluded competition in top 100 city-pair markets increased from 1979 to 1985,
decreased from 1985 to 1991, but the top 100 markets were more competitive in 1991 than in 1979. In 1979, 46 of the top 100 markets had only one or two effective competitors, while only five of the top 100 had more than five effective competitors. By 1991, the number of top 100 markets with only one or two effective competitors had decreased to 26, while the number of top 100 markets with at least five effective competitors had increased to 17. Their results also showed that between 1979 and 1991, 68 of the top 100 markets experienced a decrease in the Herfindahl-Hirschman Index and 32 of the top 100 had an increase in the Herfindahl-Hirschman Index.

Studies of conduct in deregulated airline markets

The early studies of conduct in deregulated airline markets attempted to compare market conduct after deregulation with conduct during the regulated era. More recently, the focus of most studies of conduct has shifted to an examination of the relationship between market structure on market conduct. The following discussion summarizes the prior studies.
Deregulation and market conduct

Three major studies — Bailey, Graham and Kaplan (1985), Brenner, Leet and Schott (1985) and the Transportation Research Board (1991) — concluded that deregulation resulted in the wide-spread availability of discount fares. However, the same studies also mentioned wide discrepancies exist between markets. For example, The Transportation Research Board (1991) reported that average yields' for most market distances exceeding 1,000 miles declined in real terms by 10 to 30 percent, whereas yields in shorter-distance, 500-800 miles markets increased by approximately one-tenth.

Nocella (1993) also noted that by 1983, prices in short-haul markets had increased substantially, while those in longer markets fell, which may have left short-haul fares too high and long-haul fares too low compared to the cost of providing service.

* Yield is defined as passenger revenues divided by revenue passenger miles, or, more simply, as fare divided by distance.
Results from the Transportation Research Board and Nocella which indicate short-haul fares have risen while long-haul fares have fallen are especially important to the present study. Southwest predominantly serves short-haul markets, and the spread of Southwest's low-fare service in recent years might result in significantly different conclusions regarding short-haul fares.

Morrison and Winston (1986) concluded deregulation produced annual welfare improvements of at least $6 billion in 1977 dollars due to price competition and the increase in flight frequency due to hub-and-spoke operations. However, they also observed considerable disparity in results between markets. Morrison and Winston (1990) found that average yields disguise considerable variance in deregulated fares; for some travelers and on some routes fares are significantly greater than regulated fares would have been. For example, because C.A.B. fares on long-distance routes were deliberately set above costs and short-haul fares below costs, deregulated fares in long-haul markets decreased while fares increased in short-haul markets.
Market structure and market conduct

Graham, Kaplan and Sibley (1983)\textsuperscript{62} offered the following observations about deregulated fares: (i) fares are inversely related to distance; (ii) traffic density did not have a significant impact on fares; (iii) average fares in markets served by newly certificated carriers were significantly lower; and (iv) there was a significant and direct relationship between fares and the Herfindahl-Hirschman Index. In relatively concentrated markets, the dominant carrier does exercise some market power in pricing, but if the Herfindahl-Hirschman Index is 0.5 or higher, further increases in concentration have little effect on fares.

Call and Keeler’s (1985)\textsuperscript{63} regression model based on 89 inter-state city-pairs markets concluded that a shift from a monopoly to four equal-sized firms would reduce the fare by 10.5 percent, and the entry of a competitor into a new market would reduce the yield by 7.5 percent. Fares did not change until after a competitor entered the market, which suggests the mere threat of entry will not result in long-run competitive prices. Moreover, the authors argue
the mere presence is not enough to discipline market fares, rather the competitive threat must be significant, which suggests the use of a large market share to define effective competitor.

Hurdle, et al. (1989)\textsuperscript{64} concluded that market structure does matter — a reduction in the number of incumbents from three to two would increase yield 0.8-2.7 cents, or 4.1-12.4 percent. Reiss and Spiller (1989)\textsuperscript{65} also uncovered a negative correlation between fares and the number of firms.

Borenstein (1989)\textsuperscript{66} found that: (i) the dominant carrier on a route and at both endpoint airports on the route charged fares higher than the average on comparable less-dominated routes; (ii) less dominant carriers on the route did not charge above-average fares; and (iii) the carrier with a dominant share on a route or the route’s endpoints charged higher fares than competing carriers on the same route. He also concluded that a one percent increase in a carrier’s share of the route is estimated to increase its prices by between 0.03 percent and 0.22 percent.
The General Accounting Office (1989)\textsuperscript{67} concluded that in 1988, the average yield in all markets from a set of concentrated airports was 27 percent higher than the yield in all markets at a set of less concentrated airports, and that the yields of the dominant carriers at the concentrated airports usually rose following the establishment of their dominant positions. The General Accounting Office (1990)\textsuperscript{68} updated its 1989 report by including results from the first two quarters of 1989, and found that the difference between average yields at concentrated airports and at unconcentrated airports had widened.

Leigh (1990)\textsuperscript{69} observed that market concentration, measured by the Herfindahl-Hirschman Index, is positively and significantly related to market fares. Leigh concluded market power can be gained through development of hub-and-spoke network, and carriers achieving the market power use it to charge higher fares.

Morrison and Winston's (1990)\textsuperscript{70} regression model indicated: (i) an inverse relationship between fares and number of effective competitors on both a route and at the
endpoint airports; and (ii) the magnitude of the inverse relationship (i.e., coefficients of independent variables) increased over the two time periods chosen (i.e., 1978-1981 versus 1982-1988) suggesting that competition was becoming increasingly important in determining fares on a specific route.

The Department of Transportation's (1990) comprehensive fare study provided many important conclusions relevant to the empirical analysis of The Southwest Effect. First, yield generally declines with distance, but within each mileage interval, concentrated markets tend to have higher yields, with yield generally declining as the number of competitors increases. Second, as a carrier's market share increases, it is able to charge more than a carrier with a lesser market share — particularly in shorter-haul markets, where once a carrier attains a 60 percent market share, it can command a significant yield premium. Third, the data reveal strong tendencies for price to drop when entry occurs and then for price to increase either when exit occurs or when the same carriers compete for more than a relatively short time spans.
The Department of Transportation cited an example from Phoenix, where two low-cost carriers — America West and Southwest — both have a significant presence. The Department of Transportation found that entry and the resulting competitive struggle brought fares down in most Phoenix markets in the mid 1980s, but in the absence of still more entry, fares have since risen in nearly all Phoenix markets, and in several markets the increases have been quite large.

The Transportation Research Board (1991)\textsuperscript{71} analysis was similar to that used in this study's empirical analysis of The Southwest Effect. The Transportation Research Board computed and compared simple cross-tabulations of data stratified by traffic density, length of haul and number of effective competitors. The Transportation Research Board found that average yields for most long-haul market stratifications declined in real terms by 10 to 30 percent, whereas yields in shorter-haul market stratifications increased by 10 to 25 percent. However, an important exception was high-density, short-haul markets where yields declined by about three percent. The
study was one of the few to specifically mention
market response — it analyzed changes in passenger demand
by market stratification.

Borenstein (1992) reported that between 1984 and 1990
prices on short-haul routes increased five percent more
than an industry cost index, while prices on longer routes
increased ten percent less than the cost index. Moreover,
prices on routes with two active competitors averaged
about eight percent lower than on monopoly routes. A
third active competitor was associated with another eight
percent price drop.

Borenstein (1992) also found that average fares at 18 of
the top 30 airports were above the national average for
comparable routes, with the premium ranging from 2.9
percent at New York's Kennedy airport to 31.5 percent at
Minneapolis. It is worth noting that only one of the 18
premium-fare airports — Houston's Intercontinental — was
served by Southwest at the time of Borenstein's study. On
the other hand, at 12 of the top 30 airports, average
fares were below the national average and Southwest served
eight of the airports. The other four airports with lower than average fares were popular tourist destinations — Honolulu, Miami, Orlando, and Tampa. Borenstein did not draw any inference about the absence or presence of Southwest.

Brueckner, Dyer and Spiller (1992)\textsuperscript{12} studied only fares paid by connecting passengers and found fares are inversely related to the number of competing carriers, with diminishing returns to market competition. Introduction of a second competitor in a market lowers average fares by 7.7 percent, a third competitor results in an additional 3.4 percent decline in market fares, and the entry of additional competitors further lowers average fares by 0.6 percent. The authors also studied the impact of merging two route networks, and found that after a merger, fares decreased in markets where there was no reduction in competition, but in markets where competition was eliminated by the merger, average fares rose.

Evans and Kessides (1993a)\textsuperscript{13} reported that between the fourth quarter of 1978 and the fourth quarter of 1988, average real yields in all markets fell 16 percent, but
the average masks divergent trends. The decline in
ticket prices was greatest for the longest routes, while
the shortest routes tended to have the greatest likelihood
of experiencing an increase in real yields. The authors
concluded monopoly control of routes confers pricing
power. Moving from monopolies to duopolies causes prices
to decline by 3.3 percent and adding a third and a fourth
competitor only decreases price by 1.5 and 0.5 percent,
respectively. The authors also concluded that airport
dominance has a much larger impact on pricing than route
dominance.

Market conduct relative to specific carriers

The previous section discussed studies linking the level
of market structure with general market conduct. The
studies were primarily interested in identifying any links
between the overall level of market competition and market
conduct measured by price. This section looks at studies
that have focused on market conduct when specific firms or
types of firms enter.
Graham, Kaplan and Sibley (1983)\textsuperscript{74} found that low-cost airlines were forcing down fares in the markets they serve. The authors specifically discussed the cost advantage Southwest enjoyed over United.

The Bailey, Graham and Kaplan (1985)\textsuperscript{75} analysis of route and pricing development between 1978 and 1981 is especially interesting because all three are former Civil Aeronautics Board employees who were involved with the deregulation process. The authors concluded average fares in markets served by new entrants were 20 percent lower than in similar markets they did not serve. Moreover, they found the incumbents typically waited until actual entry occurred before matching the fares of the new carriers — the incumbents did not cut fares to deter entry.

The Morrison and Winston (1986)\textsuperscript{76} model showed that increases in the number of actual and potential carriers in a market reduce the difference between optimal and deregulated welfare, but there are important statistical differences by airline size classification and by newly certificated and established carriers.
The General Accounting Office (1991)\textsuperscript{77} concluded that a 65 percent increase in an airline’s market share on a route was associated with six percent higher fares on the route. More importantly, the General Accounting Office found that a 15 percent increase in the costs of the lowest-cost airline on a route resulted in a three percent increase in average fares for all airlines serving the route. The General Accounting Office also concluded that fares on short-haul routes were more strongly influenced by airport slot restrictions, the level of operating costs of the least-cost airline, and airport congestion than were fares on long-haul routes.

Whinston and Collins (1992)\textsuperscript{78} found that incumbents on routes entered by People Express dramatically lower their prices in response to entry: on average, the mean of incumbents’ prices fell roughly 35 percent. Importantly, the authors also provide a justification to study developments in adjacent markets, because they found price reductions of 15 percent occurred on the routes between other airports in the same city-pair.
Whinston and Collins also provide evidence that markets are elastic, such that market revenues will increase following a decrease in price. The authors found that the incumbents on the entered route increased their sales quantity following entry, which contradicts Brenner, Leet and Schott (1985) who stated that, in general, aggregate air travel demand appears to be relatively inelastic, such that in the aftermath of fare wars the amount of traffic stimulation had not kept up with the amount of the fare cut. The contradiction is one of the justifications for studying market response in the study.

Evans and Kessides (1993:b)\textsuperscript{79} used an instrumental variable for market share — the carrier's rank of market share on the route. They used only three ranks on each route, a separate ranking for each of the top two carriers on a route and third ranking for all other carriers on the route. They justified grouping all but the top two together by assuming changes in prices for these small carriers will not be large enough so as to move them out of the grouped third ranking.
The authors also presented a strong argument that the presence of a specific carrier on a route impacts market conduct. However, carrier-specific refers to carrier's share at the end-point airports. They argue that the bulk of any deviation from competitiveness in the airline industry is associated with airport characteristics rather than the structure of routes. They concluded a firm's perceived pricing power at the route level is actually power conveyed to it through control of airport facilities.

The Southwest Effect

Call and Keeler (1985) were among the first to comment on The Southwest Effect, by observing that incumbent firms either had to match Southwest's fares or to abandon markets to it. Based on that observation, they concluded that perhaps some very different pricing behavior is likely to occur in the airline industry over the longer run.
Bailey, Graham and Kaplan (1985) concluded
Southwest's aggressive fare and service offerings had
resulted in traffic growth ranging from 57 percent to 120
percent. However, they studied only eight interstate
markets served by Southwest.

Flint (1993) provided the following anecdotal evidence of
The Southwest Effect:

"the Chicago-Washington market was contested
primarily by United with a 43.5 percent share, American with 29.1 percent and USAir with a 17.6
percent share... Despite the presence of three
competitors in the market, the average fare was
$147, over a 612 mile stage length. By
comparison, Southwest competed with Continental
and TWA in the Houston-St. Louis market, with a
680 mile stage length. Although Southwest
dominated the market with a 61.5 percent share,
it's average fare was only $72.56, 30 percent
less than what its [then] Chapter 11 competitors
were charging and half of what American, United
and USAir charged over a similar stage length."

Nocella (1993)\textsuperscript{80} found an average increase in passenger
traffic of 143 percent, an average fare reduction of 48
percent and an increase in total passenger revenue of 26
percent after Southwest enters a market. Nocella's
analysis presents interesting statistics, but his
methodology is very weak. For example, there is no
mention of the beginning time periods, no comparisons to changes in comparable markets, and it is not stated whether the sample contains all markets entered by Southwest.

For the year ended September 30, 1992, Bennett and Craun (1993) found that the average prices for markets Southwest does not participate in for distances of 0 to 250 miles and 251 to 500 miles, are $109.92 and $130.32, respectively. In Southwest Markets of similar distances, the average prices charged by all carriers are $56.29 and $57.61, respectively. While an interesting finding which suggests Southwest’s presence is related to lower average fares, the number of markets used to derive the authors’ findings is unclear.

A significant portion of the authors’ analysis of The Southwest Effect is based on their analysis of eight airport-pairs known as the California Corridor, one of the busiest air travel markets in the country.* Bennett and

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* The California Corridor consists of the following eight airport-pairs: San Francisco-Los Angeles, San Francisco-Burbank, San Francisco-Ontario, San Francisco-Long Beach, Oakland-Los Angeles, Oakland-Burbank, Oakland-Ontario, and Oakland-Long Beach
Craun tracked changes in fares and the number of Origin and Destination passengers per day each way (O&D pdew) in the eight airport-pairs between the first quarter of 1989 and the third quarter of 1992. The authors reported Southwest entered its first California Corridor airport-pair — Oakland-Ontario — in the third quarter of 1993, and as a result Oakland-Ontario fares declined by 60 percent and the number of O&D pdew tripled.

Moreover, according to Bennett and Craun, the traffic increase did not come at the expense of traffic in other California Corridor markets, because when Southwest entered Oakland-Ontario prices in all eight airport-pairs dropped dramatically, leading to traffic increases in each. Their findings of lower fares and higher O&D pdew in the Oakland-Ontario market and in the seven airport-pairs not served directly by Southwest support the need to study the relationship between Southwest’s presence and market conduct and response in both Southwest Markets and in Adjacent Markets.

Bennett and Craun claimed Southwest’s prices were beginning to increase in markets where there was no
competition and load factors have attained relatively high levels. According to the authors, the issue is whether higher fares are a short-term phenomenon, until Southwest can increase its capacity to replace the capacity of exited carriers, or whether Southwest's strategy is to raise prices in the absence of more effective competition. The present study provides an update of fare changes in Southwest Markets.

Bennett and Craun's findings hint at a relationship between Southwest's presence and market structure and conduct in both Southwest Markets and in Adjacent Markets. However, their failure to provide sufficient details on their methodology (e.g., size of database used for nationwide fare comparisons), the absence of a complete reporting of results (e.g., trend lines with no supporting data), the limited scope of their work (e.g., eight California Corridor markets), and questions regarding the proper interpretation of their results are the justifications for this study. An example of the last point includes Bennett and Craun's attribution of Southwest's presence as the cause of the observed differences in market structure, conduct and response.
For example, the authors make the following claims based on their findings:

1. "The principal driving force behind dramatic fundamental changes that have occurred and will occur in the U.S. airline industry ... is the dramatic growth of ... Southwest Airlines ..."

2. Southwest is having a profound effect on the airline industry ...

3. Southwest is rapidly dominating dense short-haul markets ...

4. Southwest controlled or strongly effected price ...

5. Southwest, more than any other airline, is causing the industry to change ... [and]

6. Southwest’s entry often causes incumbent [sic] carrier revenues to drop by half.”

However, Bennett and Craun’s conclusions regarding cause and effect, while appealing based on the data presented, appear to be overly optimistic given the limited number of markets studied and the method used in their analysis. In particular, Bennett and Craun’s technique of relating Southwest's presence to reduced competition, lower fares and lower revenues might be appropriate for establishing a correlation, but the technique is not appropriate for
attributing cause and effect. Nevertheless, Bennett and Craun’s findings provide a bases for some of the hypothesized correlations in the present study.

In particular, the present study undertakes a more rigorous assessment of the hypothesized correlation between Southwest’s presence as an effective competitor and the structure, conduct and response in airport-pairs. Moreover, the present study expands the scope of the Bennett and Craun report by studying a much larger data set and by including a formal analysis of Adjacent Markets.

Morten Beyer Associates (1994)\(^3\) observed that Southwest competes in 60 of the top 200 markets, and Southwest’s average fare is 14.40 cents per mile, or about $0.60, in those 60 markets. The other major airline in the same markets has an average fare of 18.00 cents per mile — 25 percent higher in the same markets, charging an average fare of $75. The study concluded that if Southwest or a comparable carrier were a factor in all U.S. markets, air
fares would be half of what they are today — saving the American public over $20.0 billion per year.

Roberts, Roach and Associates (1994) studied changes at ten major California airports between 1980 and 1993. Their analysis suggests Southwest has an impact on operations at adjacent airports. For example, they refer to airlines experimenting with higher fares at San Francisco (not served by Southwest) to find what higher amount could be charged before causing passengers to drive to Oakland (a Southwest Airport). In the markets Southwest does serve, the authors found fares were lower and traffic demand significantly higher compared to levels prior to Southwest's entry. According to the authors, Southwest needed just five years to become the largest carrier in the huge California market.
Southwest Airlines, Inc.

The following discussion provides a brief corporate history of Southwest Airlines. In addition, this section summarizes the major components of Southwest's competitive strategy.

Corporate history

Southwest is the most successful of the low-fare carriers, having risen from a small intra-state carrier serving just three Texas cities in the late 1970s, to become one of the ten largest U.S. passenger airlines and the only one to have been profitable in every year since deregulation. Due to its success, Southwest has become the role model for a new generation of start-up carriers who seek to compete against the incumbent majors.

The travails of getting Southwest started have become industry lore. The following is a summary from Abshier (1991). In 1966, Rollin King, a pilot-owner of a small charter airline sought the legal counsel of Herbert
Kelleher to dissolve King's failed venture. King, on the advice of his banker, also made a proposal to Kelleher for a new, larger airline to provide air service links among Texas' three largest cities.

King's proposal was based on four premises. First, the distances between cities were great enough to justify air service. Second, the booming Texas economy would generate sufficient demand to support the proposed services. Third, C.A.B. controls had created airline monopolies, which, in turn, resulted in relatively high fares and poor service on the proposed routes. Fourth, the new airline would be modeled after PSA, which had succeeded in the intra-California market with low-fares and a highly regarded corporate image derived from its light-hearted approach to customer service.

King and Kelleher submitted a route application to the Texas Aeronautics Commission (TAC) in 1967 and in 1968 they were awarded a certificate to provide intra-state Texas service. The following day, Braniff, Continental and a small intra-state carrier objected a court injunction prohibiting the delivery of the TAC
certificate, thereby blocking start-up of the new airline. For the better part of the next three years, Kelleher fought the other airlines in state and federal courts, and ultimately to the U.S. Supreme Court before finally prevailing. During the protracted legal battles, initial investors backed out forcing Kelleher to invest more of his own money and to donate much of his legal services to keep the airline proposal alive.

Kelleher and King hired Lamar Muse to run the new airline, and his extensive airline experience proved invaluable during the early years. Characteristic of Southwest's future growth, the carrier took advantage of other airlines' problems to obtain new Boeing 737 at very attractive prices. Similarly, the recession of the early 1970s had resulted in furloughs of experienced airline managers who eagerly joined the new airline.

The airline began revenue service in June 1971 with three airplanes and service to Dallas, San Antonio and Houston. Capitalizing on its base at Dallas' Love Field, Southwest developed its non-too-subtle, but highly-successful 'Love' promotional campaign which included flight attendants
attired in hot pants and leather boots serving 'Love Potions' (soft drinks) and 'Love Bites' (peanuts).

The airline’s unique philosophy of competition actually evolved out of necessity. In the beginning, Southwest did not fly on weekends and the airplanes at Houston and San Antonio were flown empty back to the Dallas base for routine maintenance every Friday night. In an attempt to generate some revenue to cover the fuel costs, the airline began offering all seats on the Friday night flights for $10 (the C.A.B. had no jurisdiction on pricing of intra-state flights), and within two weeks the flights were full even though Southwest had not advertised the fares. Southwest thus discovered, that by making air travel competitive with driving, passengers could be lured onto flights they would not otherwise take. The $10 fare also represented the introduction of Southwest’s two-tier (peak and off-peak) pricing structure still in use.

Southwest’s quick turn-around also was born of necessity. Four months after starting operations, Southwest acquired a fourth 737 so it could begin offering hourly shuttle
service in the Dallas-Houston market. However, the airline’s cash flow was so critical the airline was purchasing fuel on the executives’ personnel credit cards. Consequently, when Southwest received a lucrative offer to sell one of its 737s in June 1972, Southwest accepted. The sale temporarily relieved the airline’s cash flow problems, but also forced the airline to find a way to maintain its schedule with 25 percent capacity. The solution was the quick turn-around. By getting an arriving flight off-loaded, provisioned, and all departing passengers and their bags loaded in ten minutes or less, Southwest found it could maintain its schedule with a smaller fleet. The quick turn-around remains one of Southwest’s most noteworthy accomplishments and one of its most important competitive strengths.

A third defining moment in Southwest’s early history, and that continues to play a role in the company’s success today, occurred when Braniff initiated a fare war on Southwest’s vital Houston-Dallas route. Braniff introduced a $13 fare between the two cities, one-half the existing fare Southwest had been charging. Southwest countered by: (i) matching the fare; (ii) launching an
aggressive advertising campaign proclaiming 'Nobody is Going to Shoot Southwest Out of the Sky for a Lousy $13'; and (iii) offering every full fare ($26) passenger a gift bottle of a premium liquor.

The campaign was wildly successful (e.g., Southwest became the largest liquor distributor in Texas) because it established Southwest as a sympathetic underdog and built intense loyalty among expense-account travelers who appreciated the free gift they did not have to share. Braniff conceded the battle and withdrew from the market. Today, Southwest continues to promote its image as the David battling the industry's Goliaths, and its reputation for the most distinctive customer service in the industry. Southwest has "establish[ed] itself firmly in the public mind as the airline of choice, if there is a choice." 86

In December 1993, Southwest acquired Morris Air, a Salt Lake City based carrier whose operation mirrored Southwest — low-fare, short-haul point-to-point service in 737 aircraft. The acquisition of Morris will enable Southwest to rapidly increase the size of its 737 fleet, which will
in turn permit the continued expansion of Southwest’s services.

In November 1993, Southwest placed a $2.5 billion order with Boeing for 63 new aircraft. The new airplane will be capable of flying farther and faster than current models of Boeing 737 airplanes in Southwest’s fleet. The order is especially significant because when deliveries begin in 1997, Southwest would have the technology to "fly transcontinental routes or other long distances," a capability Southwest lacks currently.

Southwest reported net income of $179 million for the year ended December 31, 1994, continuing the company’s string of profitable years, but the 1994 results included a poor fourth quarter performance. Southwest’s fourth quarter net income of $20 million, was nearly 50 percent lower than the $38 million net profit earned in the fourth quarter of 1993. Southwest attributed the lower earnings to "rapid expansion, aggressive fare discounting and increased competition from low-fare rivals."
Southwest has taken steps to further its cost leadership position. First, in November 1994, the airline negotiated a ten-year contract with its pilots union that freezes pilot salaries for five years and then provides for three-percent increases in three of the next five years. In return, the pilots were granted for stock options and profit sharing bonuses. The contract "could save the carrier hundreds of millions of dollars in expenses, [and] could serve as the basis for contracts with other labor groups." A ten-year captain at Southwest earns about $147,000 per year and a five-year first officer about $89,500 per year.

A second initiative to reduce costs is the move toward ticketless travel. In the intra-California market, Southwest passengers can "confirm their reservations with a credit card and board their flights with only their confirmation number as proof of that reservation. By removing paper tickets from the travel process Southwest eliminates the need for scores of workers to sort and track paper ticket stubs."
In July 1995, Southwest announced plans to expand service to Florida by commencing operations at Tampa, Fort Lauderdale and Orlando beginning in the first quarter of 1996. According to a Wall Street Journal article, "Florida will be just part of an aggressive push over the next few years, as Southwest tackles new markets in the Midwest, and fills some routes in the West." The decision to expand to Florida was based in part on Southwest's desire to stay "ahead of a flurry of upstart carriers".91

In July, Southwest also announced six month profits of $72 million on revenues of $1,359 million, compared with profits of $100 million and revenues of $1,280 million in the first six months of 1994. The lower earnings were attributed to problems with the merger of Morris Air operations and competitive battles in California with Shuttle by United. Southwest reported a strong second quarter and claimed to have strong bookings for the third quarter.
Route network

At yearend 1993, Southwest served only one of the top five airports in the country (Los Angeles International) and only nine of the top 30. Southwest's success is remarkable given that the top 30 airports accounted for 68.5 percent of all U.S. passenger enplanements in 1993. Southwest's four primary markets are the Texas intra-state, California intra-state, desert southwest, and midwest. The weighted average market share of total enplaned passengers by Southwest at all of the airports it served at yearend 1993 was 24.6 percent.

Southwest does not operate a hub-and-spoke system. Consequently, about two-thirds of Southwest's passengers are on nonstop itineraries. Although Southwest does not schedule for connections, many passengers do take advantage of convenient single-plane direct service. In 1993, the average passenger haul was 495 miles, and the average aircraft trip length was 376 miles. At yearend 1993, 26.9 percent of Southwest's segments were under 250 miles, 58.3 percent were 250-500 miles, 9.8 percent were 500-750 and the remaining 5.0 percent were over 750.\textsuperscript{92}
Competitive advantages

Southwest claims it "is unique in the airline industry as the nation’s only shorthaul, point-to-point, low-fare, high-frequency airline." Its success has been attributed to three basic strengths — service consistent with the expectations of its core customers, outstanding management, and adherence to a low-cost strategy.

Service

Southwest has been able to operate at the industry’s lowest costs and highest productivity without sacrificing customer service. In 1993, Southwest had the best on-time record, fewest baggage handling complaints, and highest overall customer satisfaction rating of any major U.S. airline, for the second year in a row.

Southwest offers high frequency service, and rather than raise ticket prices when aircraft loads begin to increase, Southwest adds more flights. Frequent flights appeal to
business travelers and low fares appeal to
discretionary travelers. Southwest has been able to
satisfy the desires of both segments without alienating
large numbers of either.

Proof of Southwest’s appeal came in the summer of 1994
when Southwest flights were de-listed from three major
computer reservation systems (CRS). Travel agents, who
account for about 85 percent of domestic airline ticket
sales, rely on CRS to find airline schedules and fares,
book reservations and issue tickets. It was widely
believed Southwest’s de-listing would adversely affect
sales. “Despite predictions of gloom and doom,
Southwest’s load factors three months later were the
highest in 15 years for the same time period; obviously,
consumer appetites for low fares overcame the new
obstacles.” 94
Management

A regression model developed by Caves, Christensen and Tretheway (1984)\(^5\) found average stage length was the most significant variable in explaining differences in unit costs among carriers. However, Southwest and USAir have vastly different unit costs despite similar average stage lengths. Borenstein (1992)\(^6\) attributes the cost difference between USAir and Southwest to management.

Much of the airline's success has been attributed to Chairman Kelleher's "unorthodox personality and engaging management style. The old fashioned bond of loyalty between employees and company may have vanished elsewhere in corporate America, but it is stronger than ever at Southwest."\(^7\) Nearly 90 percent of Southwest employees are union members, but labor-management relations are considered among the best in the industry.

Kelleher's unorthodox management style does not mean the company has lacked sound business acumen. When Southwest does enter a new market, it generally seeks to link the
new station with only a few other stations and to provide relatively high frequency in the new airport-pairs. Sorenson (1991) observed that Southwest’s average number of flights per network node was 29.276 compared to the industry average of 6.448. Southwest’s controlled expansion has kept the airline’s debt at manageable levels, thereby avoiding the risks of high leverage in a cyclical industry.

Moreover, the airline’s financial strength enables it to move very quickly when new market opportunities or competitive threats arise. For example, Southwest commenced service at Little Rock to prevent a low-cost rival from establishing a presence and expanded at Phoenix when America West had to cut back to conserve cash while in Chapter 11. When Midway shut down operations in 1991, Southwest moved in to take a large proportion of the abandoned gates and is now the largest carrier at Chicago’s second airport.
Cost Leadership

Chairman Kelleher claims
"Southwest has always approached the airline business with a totally different philosophy, charging the lowest fares possible to generate the most traffic ... Our primary competitor is the automobile, not other airlines. We're always concerned about having our fares lower than the out-of-pocket costs of driving a car."

Southwest’s operations are designed to minimize costs. However, there are only two means for establishing cost leadership — acquire resources at lower costs than competitors or be the most efficient user of resources. Southwest’s cost strategy is based on being a more efficient user of resources than its competitors.

Southwest is continually able to achieve the highest asset utilization and employee productivity of any U.S. airline. For example, Southwest airplanes spend considerably less time on the ground than rivals’ fleets. Consequently, in the third quarter of 1994, Southwest’s fleet of 100 Boeing 737-300 aircraft achieved an average daily utilization of
11.4 hours per day compared with 10.2 hours per day for both United and USAir.100

Southwest cites the following benefits of a quick turn. First, more revenue generating flights per day — "Southwest estimated it loses $182 million in revenue a year if its airplanes stay on the ground an extra four minutes per flight."101 Second, less time occupying airport gate means Southwest needs to lease fewer gates. Third, quick turns reduce the ratio of ground time to air time, which is especially important in short-haul operations. Fourth, Southwest claims it would have to invest an additional "$600 million to buy more jets if its planes sat on the ground for 45 minutes, the industry average."102

Southwest’s fleet is composed of one aircraft type which saves on training costs, scheduling, and maintenance. To match capacity and market demand, Southwest uses three versions of the Boeing 737 — models 200 and 500 typically configured with 122 seats each, and the model 300 typically configured with 137 seats. Southwest
subcontracts with others to perform major maintenance work, which saves the huge overhead burden of a maintenance base.

Southwest's ratio of passengers per employee is 2,443 compared to about 1,100 at both USAir and Delta and about 800 passengers per employee at both American and United.\textsuperscript{103} Southwest's flight crews are paid by segment, not by the hour, which encourages faster turnaround. Flight crew members have been known to assist with baggage handling and cabin cleanup to maintain schedule.

Morten Beyer and Associates (1994) attributes Southwest's cost advantage to the following productivity factors: (i) the average American pilot flies 371 hours per year, compared to 672 for his Southwest counterpart. If American's pilots flew as much as Southwest's, American would only require 4,180 pilots — a reduction of 3,385 airmen; (ii) applying similar ratios to other flight positions shows that 690 of American's 1,541 flight engineers would be dismissed, and American would require 6,216 fewer flight attendants; (iii) if American's ground operations were as efficient as Southwest's, American
would require 20,000 fewer ground servicing
employees; and (iv) 3,703 management positions could be
eliminated in American’s computer reservations systems,
frequent flyer and commuter airline operations. American
concedes it would be profitable with Southwest’s level of
employee productivity because American’s total labor costs
"would have been $1.1 billion less... if its labor cost
and work rules could be brought under the kind of control
that Southwest has."\textsuperscript{104}

Southwest cuts costs in a variety of other ways. For
example, food service is limited to beverages and peanuts
or crackers, which are cheap, easy to store, serve and
provision. Southwest does not pay to interline, which
requires connecting passengers to handle their own bags.
Southwest’s simple frequent flyer program does not require
a large investment in data processing equipment or
manpower — each passenger keeps his own record.
Southwest does not pay for computer reservation systems
listings, relying instead to sell about 45 percent of its
tickets directly to the public, three times the industry
average. Every ticket sold directly by one of Southwest’s
own reservation employees instead of a travel agent saves Southwest the typical ten percent commission and helps Southwest control distribution costs, which are one the industry's fastest growing expense items.  

By remaining focused on its basic low-fare, high-frequency, short-haul strategy and by growing conservatively as opportunities became available, Southwest has been able to avoid the plight of nearly all new entrant carriers. Moreover, Southwest has grown to become a major force in the deregulated marketplace.

Southwest's ability to thrive even after having had access to nearly 50 percent of its distribution network blocked when delisted from three large CRS demonstrates "the power low-fare carriers wield and reinforces the notion that in these bargain-seeking times, consumers drive the market."  No carrier appears better positioned to prosper from price-driven competition than Southwest. According to Stephen Wolf, the former Chairman of United, "Southwest is the most profitable and perhaps the most feared competitor in the country."
Summary of Chapter Two

The empirical study of The Southwest Effect is motivated by the industry's recent financial problems. As noted in Chapter One, Congressional Hearings and studies by the General Accounting Office attributed the industry's financial problems to worldwide recession, high fuel costs, increased leverage and widespread fare wars instigated by cash-starved Chapter 11 carriers. The industry's recent financial problems, although more severe, are similar to the losses incurred in the early years of deregulation, and the litany of causes appears to be similar also.

Brenner, Leet and Schott (1985) cited the jump in fuel prices, the recession and uneconomic pricing strategies to compete with new entrants as causes for the industry's financial problems in early 1980s. Brenner, Leet and Schott concluded that the highly publicized fare wars raised a fundamental question of whether the industry can, over an extended period, maintain economic pricing in a free market. The question appears to be timely ten years later as major carriers such as American, United and USAir
cite price competition from low-fare carriers as the fundamental source of their financial problems.

What does appear to distinguish the industry's financial problems of the 1990s from the financial problems of 1980s is the staying power of the largest low-fare competitor. In the early 1980s, the role model of the aggressive low-fare carrier was People Express, but by yearend 1986 most of the new entrants, including People Express, had ceased to exist. Researchers such as Levine (1987) and Evans and Kessides (1993a) believed the surviving incumbents had developed strategies, such as hub-and-spoke networks and frequent flyer programs, that created sufficient barriers to entry to prevent future competitive incursions by low-fare carriers. Analysts such as Sorenson (1991) were concluding competition from low-fare carriers had largely disappeared from the industry by the late 1980s. Coincidentally, the domestic airline industry enjoyed a period of unprecedented prosperity.

However, by 1990, the industry recorded the first of several huge losses, and a study conducted for the U.S. Department of Transportation by Bennett and Craun (1993)
linked the industry's losses to Southwest's presence. Unlike People Express, however, Southwest's tactics appear to be immune to the competitive strategies of the incumbent carriers. While most of the major carriers were reporting huge losses in the early 1990s, Southwest continued its unbroken string of annual profits. Moreover, while other carriers were canceling orders for new aircraft, laying off employees and downsizing their route networks, Southwest continued to expand. Nocella (1993) concluded Southwest had become the role model of the low-fare, post-deregulation carrier, which is capable of successfully challenging the incumbents. Indeed, Bennett and Craun (1993) assert the major carriers can not compete with Southwest and are retreating from markets served by Southwest.

To analyze Southwest's growth, the study utilizes the market structure-conduct-performance approach to industrial organization developed by Bain (1968). The methodology is patterned after the Transportation Research Board's (1991) stratification analysis of market structure, conduct and response.
Market structure, focuses on, among other things, the extent to which a market is dominated by a few firms. Bailey, Graham and Kaplan (1985) reported the airline industry tends to be highly concentrated relative to other industries, and Brander and Zhang (1990) concluded airline markets fit an oligopolistic model and are not conducive to large numbers of competitors. Bailey, Graham and Kaplan (1985) also observed short-haul markets, the type predominantly served by Southwest, tend to have fewer competitors than long-haul routes.

Other studies, such as Morrison and Winston (1990), the Department of Transportation (1990), and the Transportation Research Board (1991) found that the level of competition in airline markets appeared to be increasing and airline markets were becoming less concentrated. However, more recent studies by Borenstein (1992) and Belobaba and Van Acker (1994) suggest the trend has reversed and airline markets are becoming less competitive and more concentrated. The claims by Bennett and Craun (1993) that Southwest is driving out competitors in markets it serves support the more recent findings. The study of The Southwest Effect attempts to determine
the extent to which Southwest is dominating the markets it serves.

Market structure is believed to be related to market conduct, especially the prices charged by competitors. Numerous studies, including Call and Keeler (1985), Hurdle, et al. (1989), Borenstein (1989), the General Accounting Office (1989), Leigh (1990), and Morrison and Winston (1990), all concluded there is an inverse relationship between airline market structure and fares. According to the studies, markets with fewer competitors tend to have higher fares. Brenner, Leet and Schott (1985) provide a common assessment of the changes arising from deregulation —

"Deregulation has resulted in wide disparity between markets. The more visible and publicized price wars on some routes have been offset by other routes, where prices have doubled or more than doubled... Even in the same basic market, there have been great disparities between the prices available at one airport within a metropolitan area vis-à-vis other airports... The disparities in fares are primarily related to differences in competition and cannot be fully explained by differences in cost."
The General Accounting Office (1990) reported that "Congressional concern over higher fares has centered on fare increases that reflect growing market power, not with those that reflect cost differences."\textsuperscript{109} Congressional concern might have been prompted by studies such as the large undertaking by The Transportation Research Board (1991) which found that the least competitive markets typically have the highest yields. Of special interest is the finding of the Department of Transportation (1990) which reported that once a carrier attains a 60 percent market share in short-haul markets, the carrier can command a significant yield premium.

Bennett and Craun (1993) reported "Southwest’s average share in its own top 100 markets is 65 percent."\textsuperscript{110} The prior studies which related conduct to structure suggest Southwest, if it is dominating the markets it serves, will use its market power to charge prices higher than would exist in competitive markets. Indeed, the Department of Transportation (1990) reported fares in Phoenix markets initially fell and then experienced increases that were quite large following Southwest’s entry. The present
study of The Southwest Effect examines the structure and conduct of Southwest Markets to determine if Southwest has dominated its markets and, if so, whether Southwest is using its market power to charge higher fares.

The relationship between airline market structure and market conduct is not the only airline pricing topic which has received considerable study. For example, major studies, such as Bailey, Graham and Kaplan (1985) and the Transportation Research Board (1991) found that deregulation resulted in the wide-spread availability of discount fares. However, the studies also found great discrepancies exist between markets in terms of average fares.

More recently, the Transportation Research Board (1991) and Nocella (1993) reported long-haul fares had fallen but short-haul fares had increased substantially after deregulation. However, Bennett and Craun (1993) claim the spread of Southwest's low-fare service has resulted in "a dramatic change in the industry's pricing structure ... [because] prices in short-haul markets had declined very
significantly".\textsuperscript{111} The study of The Southwest Effect examines the contradictory findings regarding short-haul fares.

Although Southwest's presence in the industry was observed in 1985 by both Call and Keeler and Bailey, Graham and Kaplan, in both studies the references to Southwest were incidental to the major findings. It was not until 1993 that major studies of The Southwest Effect appeared. However, the studies, such as Flint (1993) and Nocella (1993) tended to rely on anecdotal evidence. Even the study for the U.S. Department of Transportation by Bennett and Craun (1993), while more detailed than prior works, was deficient in several key areas, including an incomplete reporting of their results and the analysis of a relatively small number of markets. Nevertheless, the prior studies provided the bases for the hypotheses used in this study of The Southwest Effect.

For example, the hypothesized relationship with market structure is that Southwest Markets are less competitive and more concentrated than Non-Southwest Markets, and the hypothesis is based on the findings of Call and Keeler
(1985) and Bennett and Craun (1993). The hypothesized relationship with market conduct is that Southwest Markets have lower fares than Non-Southwest Markets, and the hypothesis is based on the findings of, among others, Flint (1993), Nocella (1993), and Bennett and Craun (1993). The hypothesized relationship with market response is that Southwest Markets have higher levels of passenger demand and higher aggregate market revenues than Non-Southwest Markets, and the hypothesis is based on the findings of Bailey, Graham and Kaplan (1985) and Nocella (1993). In addition, the results reported by Bennett and Craun (1993) and Nocella (1993) formed the bases for the hypothesized relationship between Southwest’s presence and markets not directly served by Southwest.

The empirical analysis of The Southwest Effect seeks to expand the scope of the work done by Bennett and Craun and the others. Building on the techniques utilized by, among others, the Transportation Research Board (1991) and Belobaba and Van Acker (1994), the study examines changes in market structure as measured by both the number of competitors and the level of concentration to evaluate
market structure at the local level. To examine changes in market conduct, the analysis focuses on changes in weighted average one-way fares. To examine the hypothesized relationships between Southwest's presence and market response, the study uses two measures—passenger demand and market revenues. By expanding on the work of others, the empirical analysis of The Southwest Effect seeks to provide additional insights into whether Southwest's presence is related with structure, conduct or response of deregulated airline markets.

The motivation for studying The Southwest Effect is based, in part, on claims that Southwest's growth has played a key role in the industry's abysmal financial results from 1990 through 1993. The major carriers claim that low-fare carriers are revolutionizing the industry, and that the industry's losses are partially attributable to the larger carriers' inability to profitably compete with low-fare carriers. The present study of The Southwest Effect seeks to determine the extent to which Southwest, the largest of the low-fare carriers but a relatively small airline compared to American, Delta or United, might be revolutionizing the entire industry. Insights from the
analysis might help settle the debate whether the
industry's recent losses are cyclical and temporary, or
whether The Southwest Effect really is correlated with
permanent changes in the industry.

The next chapter describes the methodologies used to
examine the hypothesized relationships between Southwest's
presence and market structure, conduct and response.
CHAPTER III: RESEARCH METHODOLOGY

Introduction

In Chapter Two, the structure-conduct-performance approach to analyzing industrial organization was introduced as a framework for investigating the five general hypotheses. Chapter Two also described prior research on the structure of and conduct in deregulated airline markets. Previous studies on Southwest, including the Department of Transportation study by Bennett and Craun entitled "The Southwest Effect" which have stimulated the discussion on how Southwest might be impacting the industry were also discussed in Chapter Two. This study builds on the prior work by updating findings, addressing issues raised in prior work, and by examining new issues, such as market response.
The remainder of Chapter Three is organized in three sections. In the first section, there is a description of the data sources and collection methods. A discussion of key assumptions is in section two. The final section describes the methodologies for testing the hypotheses.

**Data sources and collection methods**

The U.S. Department of Transportation's annual "Origin and Destination Survey of Air Passenger Traffic" (the O&D Survey) is the source of the data used in the analysis. The O&D Survey is based on a sample of tickets collected by the major carriers and submitted by them to the Department of Transportation. The samples are compiled by the Department of Transportation into quarterly reports showing detailed carrier- and airport-specific data, including average fares, total O&D demand, market revenues, length of haul and market shares in airport-pairs.
The O&D Survey is widely used by airlines, airports and researchers even though it is only a sample and its accuracy is not guaranteed by the Department of Transportation. For example, the General Accounting Office mentioned misreporting of airport designations in multi-airport cities — "one major carrier reported little traffic to La Guardia [LGA] and Kennedy [JFK], but reported much more traffic to NYC [which is not an identifier for a specific commercial service airport]... [and] for many routes involving Washington, one airline often reported significant portions of traffic at WAS rather than DCA or IAD." Southwest does not serve any of the misreported airports and the misreporting would not have an impact on the means of the market variables used in the analyses. A more detailed discussion of the O&D Survey is found in Appendix B.

The O&D Survey data used in the research was extracted from a commercially available CD-ROM database compiled from the O&D Survey by Data Base Products, Inc. who has corrected for obvious reporting errors by developing filters for excluding suspicious data and by comparing O&D
Survey data with other Department of Transportation databases of traffic. Accordingly, it is assumed the O&D Survey data used in the study is acceptably reliable. Moreover, unlike the O&D Survey produced by the Department of Transportation which is on magnetic tape and requires specialized processing capabilities, the CD-ROM database is PC-based, thereby significantly simplifying the process of extracting and manipulating the O&D Survey data.

For use in the research, the CD-ROM of the O&D Survey data was used to extract for each year from 1989 through 1993 the top 3,000 airport-pairs in the continental U.S., ranked by total market revenues. For each of the 3,000 markets, the following data was extracted: the number of Origin and Destination passengers per day each (O&D pdew), average market revenues per day each way (revenues pdew), average one-way fare, and length of haul. Second, a matrix of each airline's revenues in each of the top 3,000 airport-pairs was compiled. Third, after the airport-pair market data had been extracted from the CD-ROM, the data was transferred to spreadsheets where each carrier's
market share was computed. Fourth, all Southwest Markets were identified, and a matrix of the fares charged by each carrier in the Southwest Markets was extracted. Fifth, Adjacent Markets and their Corresponding Southwest Markets were identified. Sixth, Southwest’s New Markets were identified by year of entry based on the first year Southwest served both airports. Finally, the number of effective competitors and the Herfindahl-Hirschman Index were computed for each of the 3,000 airport-pairs. Microsoft’s "Excel" spreadsheet program was used to stratify the data, run regressions and to compute means.

* Capitalized terms such as Adjacent Airports, Adjacent Markets, Corresponding Southwest Markets, New Markets, Non-Southwest Markets, Southwest Airports, Southwest Markets and The Southwest Effect refer to specific concepts which: (i) are essential to the study, (ii) have precise technical meanings in the study, and (iii) are defined in the Glossary. The terms are capitalized to avoid confusion with similar sounding terms, such as adjacent airport-pair or new market, which appear in lower cases and which are generic in meaning. Throughout the study, the convention is to capitalize technical concepts defined in the Glossary and not to capitalize generic terms.
Key assumptions

The analyses require several key assumptions regarding (i) the precise definition of the market to be studied; (ii) the guidelines for stratifying the markets; (iii) the variables used to measure market structure, conduct and response; (iv) the appropriate time frame for analysis; and (v) the identification of the appropriate year of Southwest’s entry into an airport-pair.

Market definition

The study focuses on the analysis of airport-pair markets, even though some prior studies have focused on city-pairs. The issue of market definition is not trivial. Van Acker (1991) captured the essence of the issue as follows:

"In buying transportation from Boston to Chicago, a traveler has a choice among different Chicago airports as a destination. The markets involving these different airports are not independent from one another: changes in service or price in markets to one of the airports will affect demand in markets to the other airports. Although there is probably a minimum difference in service or price below which travelers will not switch from one airport to another, we can assume that this threshold is not high and that
the different airports are therefore fairly good substitutes for one another.\textsuperscript{113}

The present study of The Southwest Effect examines airport-pairs rather than city-pairs for several reasons. First, the primary objective of the study is to analyze in detail the relationship, if any, between Southwest's presence and market structure, conduct and response. However, in large metropolitan areas such as Chicago, Dallas, Los Angeles and San Francisco there are several commercial service airports, not all of which are served by Southwest.

A second justification for defining the market more narrowly at the airport-pair level is due to the aggregation effect of city-pair data. By combining market data from all airports within the city, city-pair data hides what could be significant developments occurring at different commercial service airports within a large metropolitan area. Anecdotal evidence suggests there are differences between airport-pairs within city-pairs that deserve closer examination. For example, the study by Roberts, Roach and Associates (1994) revealed
"at Dallas/Ft. Worth (DFW)...American and Delta maintain higher prices...than are charged by Southwest at Dallas' Love Field. In the Dallas-Houston market, American's DFW average fares exceed Southwest's Love Field fares by 19 percent, Delta by 23 percent. In the Dallas-San Antonio market, both American's and Delta's DFW fares are 26 percent higher than Love Field fares. But in the Dallas-New Orleans market, American's DFW fares are 39 percent higher than Love Field fares, Delta's 45 percent higher."^{114}

A third justification for use of airport-pairs is based on potential differences between airport and city averages. If average fares in the Chicago-Columbus city-pair are found to have declined between 1991 and 1992, was the decline due entirely to the introduction of low-fares in the Columbus-Chicago Midway airport-pair, which when averaged with Columbus-Chicago O'Hare fares resulted in a lower city-pair average, or could some of the decline in average city-pair fares be due to a combination of the new low-fares in the Columbus-Chicago Midway airport-pair plus lower fares in the Columbus-Chicago O'Hare airport-pair?

By defining the market of interest at the airport-pair level, the issue of city-pair data compiled from averages of airport-pair data is not relevant. To demonstrate the
point, Table 5 compares year-to-year changes in weighted average one-way fares and the number of Origin and Destination passengers per day each way (O&D pdew)* in the six airport-pairs comprising the Washington-Chicago city-pair:

Table 5  Passengers and Fares in Washington-Chicago Markets

<table>
<thead>
<tr>
<th>Airport</th>
<th>Origin &amp; Destination Passengers Per Day Each Way (O&amp;D pdew)</th>
<th>Weighted Average One-Way Fares**</th>
</tr>
</thead>
<tbody>
<tr>
<td>BWI-MDW</td>
<td>4,340</td>
<td>67,490</td>
</tr>
<tr>
<td>BWI-ORD</td>
<td>62,720</td>
<td>190,880</td>
</tr>
<tr>
<td>DCA-MDW</td>
<td>9,140</td>
<td>10,600</td>
</tr>
<tr>
<td>DCA-ORD</td>
<td>161,850</td>
<td>133,270</td>
</tr>
<tr>
<td>IAD-MDW</td>
<td>560</td>
<td>2,180</td>
</tr>
<tr>
<td>IAD-ORD</td>
<td>41,500</td>
<td>33,850</td>
</tr>
<tr>
<td>Totals for City-Pair</td>
<td>280,110</td>
<td>438,270</td>
</tr>
</tbody>
</table>

KEY: BWI - Baltimore Washington International Airport  
DCA - Washington National Airport  
IAD - Washington Dulles Airport  
MDW - Chicago Midway Airport  
ORD - Chicago O'Hare Airport

** Average Fare in City-Pair is a weighted average based on O&D pdew.

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* Please refer to Glossary for definitions of technical terms such as weighted average one-way fare and Origin and Destination passengers per day each way (O&D pdew).
The data in Table 5 point to a fourth advantage of studying airport-pair rather than city-pair markets. By studying individual airport-pairs it is possible to determine if Southwest’s presence is correlated with conduct or response in airport-pair markets involving airports adjacent to Southwest Airports. For example, Table 5 presents anecdotal evidence suggesting Southwest’s entry in the Baltimore-Chicago Midway airport-pair is correlated with much lower fares and much larger number of Origin and Destination passengers per day each way in three Adjacent Markets: Baltimore-Chicago O’Hare, Washington National-Chicago Midway, and Washington Dulles-Chicago Midway. In contrast, Ott (1994) reported the Washington Dulles-Cleveland and Washington National-Cleveland Adjacent Markets experienced lower demand and lower fares after Southwest entered service in the Cleveland-Baltimore market. Such findings suggest the need to study Adjacent Markets as airport-pairs.

A fifth rationale for using airport-pairs rather than city-pairs is the methodological challenge of properly defining a city-pair. When the market definition is based on city-pairs, there arises a problem defining what cities
to include in the market definition of a city-pair. For example, should the Burbank, Long Beach, Ontario, and/or Orange County airports, which are part of the greater Los Angeles Metropolitan Statistical Area according to the Census Bureau, be included with Los Angeles International in a city-pair analysis of Los Angeles? Similarly, should market fares, demand, revenues and shares at Oakland, San Francisco and San Jose airports be combined into a unified city-pair analysis, and, if so, what city? Given the difficulty of deciding what airports to include in a city-pair analysis, it seems more appropriate to focus on the fares, demand, revenues and shares in individual airport-pair markets.

A sixth argument for preferring airport-pair analysis over city-pair analysis is its potentially greater use to airport managers and policy-makers. The former will have information regarding how, if at all, Southwest's presence is related to changes in airport operations and the latter will have additional information regarding the specific market changes, if any, related to Southwest's presence. Such information can be useful in a variety of contexts, such as long-term capacity planning, development of
airport marketing strategies, and formulation of aviation policy.

Even though prior studies of the airline industry have tended to use the city-pair market definition, the focus on airport-pairs is more appropriate for the empirical analysis of The Southwest Effect and represents a contribution to prior research on airline industry structure and conduct.

_Stratification of airport-pair market data_

To present the findings in a manner consistent with industry convention and prior studies, such as The Transportation Research Board (1991), the airport-pair data in Southwest Markets, Adjacent Markets, and Non-Southwest Markets are analyzed by stratifying the data into nine groupings based on two factors found to affect fares and revenues — traffic density and length of haul. The length of haul stratifications are based on the following weighted average mileage traveled by all passengers in each airport-pair: short-haul markets under
500 miles; medium-haul markets 500 to 1,500 miles; and long-haul markets over 1,500 miles. The traffic density stratifications are 1 to 50 Origin and Destination passengers per day each way (O&D pdew); 51 to 150 O&D pdew; and over 150 O&D pdew.

Market variables

For analyzing market structure in airport-pair markets, the variables used are the number of effective competitors and level of concentration. The former is the number of carriers with at least a 10.00 percent share of market revenues in a given year. The level of concentration in

* This study uses only three stratifications of both length of haul and traffic density. Most prior studies used at least four stratifications for traffic density (e.g., 10-50; 51-200; 201-500 and over 500) and as many as six stratifications of length of haul (e.g., 0-499; 500-999; 1,000-1,499; 1,500-1,999; 2,000-2,499; and 2,500–2,999). However, the additional computation complexity associated with adding more stratifications of data does not seem warranted for two reasons. First, the majority of Southwest's routes are short-haul, therefore, most of the analysis in the study focused on short-haul routes. Second, the majority of air travel demand is concentrated in a relatively small proportion of the total markets. For example, in the Department of Transportation's 1990 "Industry and Route Structure" report, the largest O&D markets — over 500 O&D pdew — accounted for only 5.8 percent of the 3,674 markets in the study, but they accounted for 47.8 percent of total passengers and 54.0 percent of total market revenues.
airport-pair markets is measured by the Herfindahl-Hirschman Index computed as the sum of the squared market shares of each airline in an airport-pair. For analyzing market conduct, the variable is the weighted average one-way fare paid by all passengers in the market. In the analysis of market response, the variables are the average number of Origin and Destination passengers per day each way and average revenues per day each way in each airport-pair.

**Time frame**

The primary objective of the study is to determine the extent which Southwest's presence as an effective competitor might be correlated with the structure, conduct or response of deregulated airline markets. The study is motivated by claims from several major carriers, the Department of Transportation and from some industry analysts that low-fare competition by carriers such as Southwest is a major factor contributing to the industry's severe financial problems. Accordingly, the time frame of
the analysis — 1989 to 1993 — is chosen for eight reasons.

First, by 1989 the industry had accumulated more than a decade of experience with the freedoms of deregulation and appeared to be entering a new phase of the deregulation experience — the revival of new entrant carriers based on the Southwest model.

Second, the 1989 through 1993 time period covers the first five years Southwest competed as a major carrier, based on the Department of Transportation's classification system.

Third, the 1989 through 1993 time period encompasses a period of relative stability in economic activity and airline merger activity.

Fourth, during the five year period of 1989 through 1993, Southwest commenced service at ten airports while most of the other major carriers were cutting back service.
Fifth, domestic passenger demand was relatively stagnant during the entire period, rising a total of only 7.67 percent between 1989 and 1993*, whereas Southwest's total enplanements increased by 105.78 percent over the same time period. Table 6 shows the enplaned revenue passengers between 1984 and 1994 reported by the Air Transport Association of America for all U.S. scheduled carriers and by Southwest.

<table>
<thead>
<tr>
<th>Year</th>
<th>National Enplanements</th>
<th>Percent Change</th>
<th>Southwest's Enplanements</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>528,376,000</td>
<td>Up 8.16%</td>
<td>42,742,602</td>
<td>Up 15.66%</td>
</tr>
<tr>
<td>1993</td>
<td>488,520,000</td>
<td>Up 2.82%</td>
<td>36,955,221</td>
<td>Up 32.74%</td>
</tr>
<tr>
<td>1992</td>
<td>475,108,000</td>
<td>Up 5.04%</td>
<td>27,839,284</td>
<td>Up 22.80%</td>
</tr>
<tr>
<td>1991</td>
<td>452,301,000</td>
<td>Down 2.05%</td>
<td>22,669,942</td>
<td>Up 14.32%</td>
</tr>
<tr>
<td>1990</td>
<td>465,560,000</td>
<td>Up 2.62%</td>
<td>19,830,941</td>
<td>Up 10.43%</td>
</tr>
<tr>
<td>1989</td>
<td>453,692,000</td>
<td>Down 0.21%</td>
<td>17,958,263</td>
<td>Up 20.71%</td>
</tr>
<tr>
<td>1988</td>
<td>454,614,000</td>
<td>Up 1.55%</td>
<td>14,876,582</td>
<td>Up 10.17%</td>
</tr>
<tr>
<td>1987</td>
<td>447,678,000</td>
<td>Up 6.86%</td>
<td>13,503,242</td>
<td>Down 0.99%</td>
</tr>
<tr>
<td>1986</td>
<td>418,946,000</td>
<td>Up 9.67%</td>
<td>13,637,515</td>
<td>Up 7.80%</td>
</tr>
<tr>
<td>1985</td>
<td>382,022,000</td>
<td>Up 10.83%</td>
<td>12,651,239</td>
<td>Up 18.26%</td>
</tr>
<tr>
<td>1984</td>
<td>344,683,000</td>
<td></td>
<td>10,697,544</td>
<td></td>
</tr>
</tbody>
</table>


* Total annual revenue passengers enplaned as reported in the 1995 Annual Report of the Air Transport Association of America.
Sixth, in 1994 the industry experienced the October launch of Shuttle by United in California and the rapid expansion of Continental Lite, "from 173 daily flights ... serving 14 cities in November 1993 to 1,000 daily flights ... serving 434 cities in September 1994." In addition, ValuJet, a phenomenally successful no-frills carrier based in Atlanta, completed its first full calendar year of operations, by nearly quadrupling in size from an average of 34 flights per day in December 1993 to 124 flights per day in December 1994.

The unusual growth of low-fare operations in 1994 is significant because airlines frequently commence service in a market by offering low introductory fares. Given the rapid expansion of the Shuttle by United, Continental Lite and ValuJet during 1994 and the possibility that one or more of the carriers might have offered unusually low introductory fares in some of their new markets, it is reasonable to assume that 1994 data includes results that reflect unusual and ephemeral pricing behavior.
Moreover, by early 1995 the Continental Lite experiment was being deemed a failure, and Continental had begun to scale back the operation. Consequently, any short-term correlation between the Continental Lite operation and market structure, conduct or response produced aberrations in the 1994 data. For example, a recent study by American Express Travel Management Services "tracked the top 1,000 city-pairs [and] found 30 to 35 percent have a low-cost competitor ... down from 46 percent during the CALite operations." In addition, it has been reported that

"the loss of Continental Lite [has resulted in] some staggering fare hikes between March [1994], when Lite was in full bloom, and March [1995, when Lite had scaled back]. For instance, the average business fare on the Greensboro-Newark and Greensboro-Atlanta routes skyrocketed 68 percent and 121 percent, respectively" after Continental Lite shut down.

* Begun in October 1993, the Continental Lite operation began to be dismantled in January 1995 when 40 percent of the Continental Lite flights were dropped. In the Company's 1994 Annual Report, Continental reported that "at its peak, approximately 35 percent of Continental Lite flying consisted of point-to-point, linear service not integrated with the Company's hubs. Linear flying proved to be significantly unprofitable and was responsible for an estimated 70 percent of all Continental Lite system losses in 1994."
Similarly, American Express Travel Related Services has reported average one-way business fares in Cleveland were $237 before Continental Lite, $166 during Continental Lite and $247 after Continental Lite died.\textsuperscript{119} Based on such anecdotal evidence of the extreme and short-lived changes associated with the Continental Lite experiment in 1994, it was decided to exclude 1994 data from the analyses.

Southwest's own rapid expansion in 1994 is a seventh reason to exclude 1994 results from the analysis. Southwest claims "1994 was the most aggressive year ever".\textsuperscript{120} In 1994, Southwest completed the integration of Morris Air's operations, which resulted in the discontinuation of service to seven cities previously served by Morris Air, plus the addition of seven new cities and 30 percent more capacity to Southwest's system. Consequently, Southwest reported roughly 20 percent of its capacity in 1994 was in new markets, "far more than usual. The airline ... historically puts only about five percent of its capacity in new markets."\textsuperscript{121}
In addition, concerns about the October launch of Shuttle by United prompted Southwest to initiate its own fare sale in the fourth quarter of 1994. However, the airline has conceded it was

"too aggressive in its discounting ... [and] acknowledged that the fare sale got out of control in that the carrier could not control 'downgrade' — passengers booking down from higher fares to take advantage of the sale fares."\(^{122}\)

Consequently, Southwest reported relatively poor fourth quarter financial results. Given the significant and unusual changes to Southwest’s route network in 1994, the 1994 results are not included in the study.

The eighth reason for limiting the analysis to the 1989 to 1993 time period is based on the primary motivation of the research study. The objective of the study is to determine the extent to which The Southwest Effect is related to structure, conduct or response in deregulated airline markets. Competing carriers have attributed their severe financial problems to the rapid growth of low-fare carriers, such as Southwest. Therefore, the analysis is limited to the years of the industry’s cyclical downturn.
The 1989 through 1993 time period begins with the decline in industry profits from the record profits earned in 1988 and ends with the apparent beginnings of the industry’s cyclical recovery. Table 7 shows the combined annual operating profits from domestic operations of the nine major combination carriers (i.e., American, America West, Continental, Delta, Northwest, Southwest, TWA, United and USAir).

Table 7  Operating Profits from Domestic Operations

<table>
<thead>
<tr>
<th>Year</th>
<th>Aggregate of Nine Major Combination Carriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>$1,266,154,854</td>
</tr>
<tr>
<td>1993</td>
<td>$1,286,210,908</td>
</tr>
<tr>
<td>1992</td>
<td>($1,716,369,161)</td>
</tr>
<tr>
<td>1991</td>
<td>($1,188,458,810)</td>
</tr>
<tr>
<td>1990</td>
<td>($1,075,956,839)</td>
</tr>
<tr>
<td>1989</td>
<td>$1,785,122,667</td>
</tr>
<tr>
<td>1988</td>
<td>$1,978,514,949</td>
</tr>
<tr>
<td>1987</td>
<td>$1,327,477,511</td>
</tr>
</tbody>
</table>

SOURCES: U.S. Department of Transportation, reported in Form 41 CD-ROM produced by Data Base Products, Inc. and in Aviation Daily.

The 1990-1992 period, which Southwest’s Chairman Kelleher referred to as the “gravest financial crisis in the history of the airline”, appeared to begin in 1989 as
passenger enplanements and operating profits fell from their record levels in 1988. By 1993, a recovery appeared to be well underway as passenger enplanements were up for the second year in a row and the nine major combination carriers recorded an aggregate operating profit for the first time since 1989. Therefore, the 1989 to 1993 time period is chosen because it appears to cover the beginning and the end of the bottom half of the industry's latest financial cycle.

Year of entry

Although the definition of a Southwest Market is based entirely on market share, determining the year of Southwest's entry into an airport-pair requires careful consideration. For analyses of changes before and after Southwest's entry into an airport-pair, the year of Southwest's entry is assumed to be the year Southwest first served both airports in the airport-pair, regardless of Southwest's share of market revenues in the airport-pair. The definition based on service rather than market share is necessary to avoid the inclusion of unusual
results associated with the introductory phase of service in a new market.

For example, even though Southwest did not achieve at least a 10.00 share of the Oakland-Reno market revenues until 1991, the Oakland-Reno airport-pair was defined to have a 1990 year of entry because Southwest introduced service at the Oakland airport in 1989 and the Reno airport in 1990. Basing the definition of year of entry on when Southwest first served both airports in an airport-pair market overcame a problem with market averages — the potential correlation between Southwest’s entry on the market’s average O&D, revenues and fares in the year(s) before the airport-pair is classified as a Southwest Market (i.e., Southwest achieved a market share of at least 10.00 percent).

For example, Southwest began service at Reno in late 1990 and no airport-pair involving Reno was listed as a Southwest Market in 1990. However, by yearend 1991, eight airport-pairs involving Reno were listed as Southwest Markets. Using 1990 rather than 1991 as the year of entry
in the eight Reno markets provided a better measure of market averages prior to entry (i.e., 1989).

For similar reasons, the definition of Non-Southwest Markets excludes airport-pairs in which Southwest served both airports. For example, the eight Reno markets which became Southwest Markets in 1991 would have been classified as Non-Southwest Markets in 1990 even though Southwest had a presence in, and a potential impact on, the market averages for 1990. By excluding the eight airport-pairs in which Southwest served both airports, but lacked the requisite 10.00 percent share of revenues, the excluded markets will not distort averages for either Southwest Markets or Non-Southwest Markets, prior to Southwest becoming an effective competitor in the markets.
Methods for testing the hypotheses

This section is divided into six main parts. Part one will describe regression analyses used to provide an initial screening of the data. Part two will describe the stratification analyses of hypotheses dealing with the structure of Southwest Markets. Part three will describe the stratification analyses of hypotheses dealing with conduct in Southwest Markets. Part four describes the stratification analyses of hypotheses dealing with response in Southwest Markets. Part five outlines the stratification analyses of hypotheses dealing with conduct in Adjacent Markets. Part six describes the stratification analyses of hypotheses dealing with response in Adjacent Markets.

Within each of the six main parts, there are three subparts. First, an introductory statement which includes the research questions addressed by the general hypothesis. Second, for each general hypothesis a number of specific hypotheses are introduced. The third subpart consists of a detailed discussion of the research methods used to test each of the specific hypotheses.
Regression analyses of structure, conduct and response

The objective of the regression analyses is not to develop predictive models of The Southwest Effect, nor are the regression analyses used to test any of the specific research hypotheses. Rather, the purpose of the regression analyses is to determine if there is a statistically significant correlation between Southwest's presence as an effective competitor and market structure, conduct and response. The U.S. Department of Transportation and many of the major airlines have claimed Southwest is the driving force in the industry and a leading cause of the industry's financial problems. The regression analyses are designed to provide some insights into such claims.

However, results from the regression analyses can only be used to suggest a possible correlation between Southwest's presence and differences in market structure, conduct and response. Results from the regression analyses cannot be used to attribute differences to Southwest's presence. An attribution of cause and effect would require an
experimental design, rather than a correlation design used in the present study.

The dependent variables in the regression analyses are those defined as the study's measures of market structure, conduct and response. The independent variables are (i) length of haul; (ii) traffic density measured by number of Origin and Destination passengers per day each (O&D pdey); (iii) interaction terms for Southwest and length of haul and Southwest and traffic density; and (iv) dummy variables for Southwest Markets, Adjacent Markets, Tourist markets, Hub airports and Slot-controlled airports.

The Southwest Market dummy variable has a value of one if Southwest's share of market revenues in the airport-pair is at least 10.00 percent. The Adjacent Market dummy variable has a value of one if the airport-pair meets all of the conditions of an Adjacent Market. Inclusion of a Tourist market dummy variable is based on prior work by, among others, Borenstein (1991). In the regression, the Tourist dummy has a value of one if the airport-pair includes an airport in Florida or the Las Vegas, Phoenix, Reno or Tucson airports. A Slot dummy has been used in
many prior studies, including the General Accounting Office (1991), and has a value of one if the airport-pair includes any one of the following four slot-controlled airports* in the U.S.—Chicago O'Hare, New York La Guardia, New York Kennedy and Washington National. The Hub dummy variable has been used by, among others, the General Accounting Office (1991), and has a value of one if the airport-pair includes at least one airport cited as a hub airport in the 1993 Annual Reports of the Major U.S. combination carriers. The definition of Hub airport in the Glossary lists the 32 Hub airports.

The expected signs of most of the regression coefficients are based on prior studies, such as General Accounting Office (1991), but signs for several of the coefficients are difficult to predict. For example, the expected signs of coefficients for the interaction terms are not intuitively obvious. On the one hand, anecdotal evidence suggests Southwest's presence results in lower fares. On the other hand, average fares tend to rise as distance

* At the four airports, congestion is so severe the FAA has imposed hourly quotas on the number of takeoffs and landings. Carriers serving the airports must obtain rights to operate takeoffs or landings at specific times of day.
increases. The net effect on average one-way fares of the interaction of Southwest’s presence as an effective competitor and length of haul is difficult to predict.

Similarly, in Adjacent Markets, the anecdotal evidence presented in Table 5 and the related discussion suggests fares decrease after Southwest enters an adjacent airport-pair. Lower fares in Adjacent Markets normally would be expected to result in higher traffic demand, as measured by the number of O&D passengers. However, anecdotal evidence presented in Chapter One’s discussion of the hypothesized conduct in Adjacent Markets also suggests passengers are driving to the Southwest Airport to take advantage of the fare savings, and the net effect on O&D demand in the Adjacent Market is difficult to predict. For the same reasons, the relationship with market revenues in Adjacent Markets is hard to predict. Table 8 lists the variables used in the five regressions — two of market structure, one of market conduct and two of market response — and the expected signs of the coefficients.
<table>
<thead>
<tr>
<th>Table 8  Linear Regression Models</th>
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<tr>
<td><strong>Dependent Variables</strong></td>
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<tr>
<td>Number of Effective Competitors</td>
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<td>Herfindahl-Hirschman Index</td>
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Based on the discussion in Chapter Two where Southwest's management is cited as a source of competitive advantage, it seems logical to conclude Southwest carefully selects the markets it serves. Therefore, it is possible the Southwest Market dummy variable is correlated with the error term (i.e., an endogenous variable) in some, if not all, of the regressions. If so, coefficients estimated by the regressions will be inconsistent and biased.

The issue of how to treat carrier identities in regressions has received some attention in prior studies. For example, Morrison and Winston (1995) noted

"There has been an unresolved debate about the appropriateness of treating [some] variables, especially the competition measures, as exogenous in fare regressions. For example, Bailey, Graham and Kaplan [1995] presented statistical tests that did not reject exogeneity, while Call and Keeler [1995] also argued that competition should be treated as exogenous and not jointly determined with fares. But other researchers, such as Peteraf and Reed have statistically rejected exogeneity. The difficulty in resolving the debate is that concerns have been raised that the statistical tests, regardless of their outcome, have low power ... When we used a disaggregate measure

of airline competition (dummy variables to identify the effect of individual carriers on fares), our findings were not materially affected by whether these dummy variables were treated as exogenous or endogenous."

If endogeneity is perceived to be a problem, one solution is to use an instrumental variable in place of the endogenous variable. For example, Morrison and Winston undertook a regression in which the dependent variable was the natural log of the average one way fare and independent variables included dummy variables for slot-constrained airports and dummy variables for each of ten large airlines, including Southwest. In their regression analysis, the authors,

"as a check for endogeneity, instrumented the carrier dummy variables using a reduced-form probit model to predict the probability of entry ... The difference between the resulting parameter estimates ... was negligible."

Based on the results of Morrison and Winston's findings, the present study treats the Southwest Market variable as an exogenous variable. Although a strong assumption, exogeneity is deemed acceptable due to the findings from
Morrison and Winston and to the intended purpose of the regression analyses. The objective of the regression analyses is to explore the possibility of a general relationship between Southwest’s presence as an effective competitor and market structure, conduct or response.

**Stratification analysis of structure in Southwest Markets**

**General hypothesis one:** The structure of airport-pair markets is correlated with Southwest’s presence.

The study first seeks to answer two questions regarding the relationship between Southwest’s presence and market structure. First, do Southwest Markets have a different structure than airport-pairs in which Southwest is not an effective competitor? Second, does a change in market structure occur after Southwest’s entry in an airport-pair market? This section describes the methodology used to test the six hypotheses designed to answer the questions regarding the relationship between Southwest’s presence and market structure.
Hypothesis 1.1: In airport-pair markets with comparable lengths of haul and traffic densities, the number of effective competitors tended to be higher in airport-pair markets where Southwest was not an effective competitor in 1993.

To test hypothesis 1.1, the following steps were undertaken. First, identification of all Southwest Markets and Non-Southwest Markets in the top 3,000 airport-pairs in the continental U.S. in 1993. Second, stratification of Southwest Markets and Non-Southwest Markets by length of haul and by traffic density. Third, determination of the mean number of effective competitors in each of the nine stratifications of Southwest Markets and Non-Southwest Markets. Finally, for each stratification the mean number of effective competitors in Southwest Markets was compared with the mean number of effective competitors in Non-Southwest Markets.

Hypothesis 1.2: In airport-pair markets with comparable lengths of haul and traffic densities, the level of concentration tended to be lower in airport-pairs where Southwest was not an effective competitor in 1993.
To test hypothesis 1.2, the same steps used to test hypothesis 1.1 were used, except the mean Herfindahl-Hirschman Index instead of the mean number of effective competitors for each stratification of Southwest Markets and Non-Southwest Markets was computed and compared.

_Hypothesis 1.3:_ In Southwest’s 1989-1993 New Markets, the number of effective competitors decreased from the year prior to Southwest’s entry to 1993.

To test hypothesis 1.3, the following steps were undertaken. First, the Southwest Markets in each year’s top 3,000 airport-pairs in the continental U.S. in each year between 1989 and 1993 were identified. Second, for each year from 1989 through 1993, Southwest’s New Markets were identified, and the year Southwest first served both airports in each New Market was determined. Third, the number of effective competitors was determined in each New Market the year before Southwest began service to both airports. Fourth, for each annual grouping of New Markets, the annual means were computed of the number of effective competitors in the market in the year prior to Southwest’s service at both airports. Fifth, for each annual grouping of New Markets, the mean was computed of
number of effective competitors in each market in 1993. Sixth, the means of each grouping's number of effective competitors in the year before Southwest served both airports were compared with each grouping's mean number of effective competitors in 1993.

Hypothesis 1.4: In Southwest's 1989-1993 New Markets, the level of concentration increased from the year prior to Southwest's entry to 1993.

To test hypothesis 1.4, the same procedure used to test hypothesis 1.3 was used, except means of the Herfindahl-Hirschman Index were computed and compared instead of the mean number of effective competitors.

Hypothesis 1.5: Between 1988 and 1993, the number of effective competitors decreased in markets among the top 3,000 airport-pairs where Southwest was not an effective competitor.

To test hypothesis 1.5, the following steps were undertaken. First, all Non-Southwest Markets in the top 3,000 airport-pairs in the continental U.S. in 1988 and 1993 were identified, and the number of effective competitors in each Non-Southwest Market in 1988 and 1993 was determined. Second, the Non-Southwest Markets were
stratified by traffic density and length of haul. Third, for each of the market stratifications, the mean number of effective competitors in 1988 and in 1993 were computed. Finally, the mean number of effective competitors in each stratification in 1988 was compared with the mean number of effective competitors in the respective stratifications in 1993.

*Hypothesis 1.6:* Between 1988 and 1993, the level of concentration increased in markets among the top 3,000 airport-pairs where Southwest was not an effective competitor.

To test hypothesis 1.6, the same procedure used to test hypothesis 1.5 was used, except means of the Herfindahl-Hirschman Index were computed and compared instead of means of the number of effective competitors.
General hypothesis two: The conduct of carriers in airport-pair markets is correlated with Southwest’s presence.

The analysis of market conduct attempts to answer two questions. First, do Southwest Markets exhibit a different conduct than airport-pairs in which Southwest is not an effective competitor? Second, does a change in conduct occur after Southwest’s entry in an airport-pair market? To answer the questions, three hypotheses are proposed. This section describes the methodology used to test the three hypotheses regarding the relationship between Southwest’s presence and market response.
Hypothesis 2.1: In airport-pairs with comparable traffic densities and lengths of haul, 1993 average fares in markets where Southwest was not an effective competitor were higher than the average fares in markets where Southwest was an effective competitor.

To test hypothesis 2.1, the same procedures used to analyze hypothesis 1.1 were used except the weighted average one-way fares were computed and compared for each stratification of Southwest Markets and Non-Southwest Markets.

Hypothesis 2.2: In Southwest’s 1989-1993 New Markets, average fares decreased from the year prior to Southwest’s entry to 1993.

To test hypothesis 2.2, the same procedures used to analyze changes in market structure for hypotheses 1.3 and 1.4 were used except the mean values of weighted average fares in each year’s groupings of New Markets were computed and compared.

Hypothesis 2.3: Between 1988 and 1993, the average fare decreased in markets among the top 3,000 airport-pairs where Southwest was not an effective competitor.
To test hypothesis 2.3, the same steps used to analyze changes in market structure in Non-Southwest Markets in hypotheses 1.5 and 1.6 were followed except for each stratification of Non-Southwest Markets the weighted average one-way fares in 1988 and 1993 were computed and compared.

Stratification analysis of response in Southwest Markets

General hypothesis three: Southwest’s presence is correlated with market response.

The analysis is designed to answer two questions regarding the possible relationship between Southwest’s presence and market response. First, does market response in Southwest Markets differ from market response in airport-pairs in which Southwest is not an effective competitor? Second, does a change in market response occur after Southwest’s entry in an airport-pair? Six hypotheses were tested to gauge the correlation, if any, between Southwest’s
presence and market response. This section describes the methodology used to test the six hypotheses.

**Hypothesis 3.1:** In airport-pairs with comparable traffic densities and lengths of haul, 1993 O&D demand in markets where Southwest was not an effective competitor was lower than O&D demand in markets where Southwest was an effective competitor.

To test hypothesis 3.1, the same procedures used to test hypothesis 2.1 were followed, except the mean level of O&D pdew in 1993, rather than the mean average fare, in each of the market stratifications of Southwest Markets and Non-Southwest Markets were computed and compared.

**Hypothesis 3.2:** In Southwest’s 1989-1993 New Markets, average annual O&D demand increased from the year prior to Southwest’ entry to 1993.

To test hypothesis 3.2, the same procedures used to test hypothesis 2.2 were followed, except the annual means of O&D pdew, rather than average fares, were computed and compared for the annual groupings of Southwest’s New Markets in the year prior to entry and in 1993.
**Hypothesis 3.3:** Between 1988 and 1993, the O&D demand increased in markets among the top 3,000 airport-pairs where Southwest was not an effective competitor.

To test hypothesis 3.3, the same procedures used to test hypothesis 2.3 were followed, except the annual means of O&D demand, rather than average fares, in each stratification of Non-Southwest Markets in 1988 and 1993 were computed and compared.

**Hypothesis 3.4:** In airport-pairs with comparable traffic densities and lengths of haul, 1993 market revenues in markets where Southwest was not an effective competitor were lower than market revenues in markets where Southwest was an effective competitor.

To test hypothesis 3.4, the same steps used to test hypothesis 3.1 were followed except mean market revenues pdew, rather than mean C&D pdew, in 1993 in each of the market stratifications of Southwest Markets and Non-Southwest Markets were computed and compared.

**Hypothesis 3.5:** In Southwest's 1989-1993 New Markets, average annual market revenues rose from the year prior to Southwest's entry to 1993.
To test hypothesis 3.5, the same procedures used to test hypothesis 3.2 were followed except the annual means of market revenues pdew, rather than O&D pdew, for each year's groupings of New Markets were computed and compared.

*Hypothesis 3.6:* Between 1988 and 1993, the market revenue decreased in markets among the top 3,000 airport-pairs where Southwest was not an effective competitor.

To test hypothesis 3.6, the same procedures used to test hypothesis 3.3 were followed, except the annual means of market revenues pdew, rather than mean O&D pdew, for each market stratification of Non-Southwest Markets in 1988 and 1993 were computed and compared.
Stratification analysis of conduct in Adjacent Markets

General hypothesis four: The conduct of carriers in Adjacent Markets is correlated with Southwest's presence in airport-pair markets.

The study seeks to answer two questions regarding conduct in Adjacent Markets. First, do carriers in Adjacent Markets exhibit conduct that is different from either Southwest Markets or Non-Southwest Markets? Second, does a change occur in the conduct of carriers in Adjacent Markets after Southwest's entry in an adjacent airport-pair? To answer the questions regarding conduct in Adjacent Markets, four hypotheses were proposed. The methodology used to test the four hypotheses is described in this section.

Hypothesis 4.1: In 1993, average fares in Corresponding Southwest Markets were lower than the average fares in their respective Adjacent Markets.

To test hypothesis 4.1, the following steps were undertaken. First, all Adjacent Markets in the top 3,000
airport-pairs in the continental U.S. in 1993 were identified and grouped with their respective Corresponding Southwest Markets*. Second, the Adjacent Markets and their Corresponding Southwest Markets were stratified by length of haul and traffic density based on the level of O&D pdeaw and length of haul in the Adjacent Markets. Third, within each stratification of Adjacent Markets and Corresponding Southwest Markets, the 1993 mean average fares were computed. Finally, the mean fares of each stratification of Adjacent Markets were compared with the mean fares of each stratification of their respective Corresponding Southwest Markets.

_Hypothesis 4.2:_ In 1993, average fares in Adjacent Markets were lower than the average fares in comparable Non-Southwest Markets.

To test hypothesis 4.2, the same steps used to test hypothesis 4.1 were used except mean fares in Non-Southwest Markets were computed for each of the stratifications and compared with mean fares in the stratifications of Adjacent Markets.

*To test this hypothesis, the definition of a Corresponding Southwest Market does not require a minimum market share for Southwest, only that Southwest served both airports at yearend 1993.
Hypothesis 4.3: In airport-pairs adjacent to Southwest’s 1989-1993 New Markets, 1993 average fares were lower than the average fares in the year prior to Southwest becoming an effective competitor.

To test hypothesis 4.3, the following steps were undertaken. First, all of Southwest’s New Markets ranked in the top 3,000 airport-pairs in the continental U.S. in each year between 1989 and 1993 were identified. Second, for each New Market, the respective Adjacent Markets were identified and classified as new Adjacent Markets based on the year Southwest became an effective competitor in the adjacent New Market. Third, the weighted average one-way fare in each new Adjacent Market in the year prior to Southwest’s presence as an effective competitor in the adjacent New Market was determined and the mean average fare was computed for each year’s grouping of new Adjacent Markets. Fourth, the 1993 mean fare was computed for each year’s grouping of new Adjacent Markets. Finally, each

* Unlike the previous two hypotheses, this hypothesis does impose a 10.00 percent market share requirement on the Southwest Market. In addition, the definition of the year of entry is based on the year Southwest first became an effective competitor rather than the year Southwest first served both airports. These requirements are based on the assumption that fares in an Adjacent Market will only be impacted after Southwest becomes an effective competitor in a nearby market. The same assumptions are made in hypotheses 5.3 and 5.7
group's mean fare from the year prior to Southwest's entry in the adjacent New Market was compared with the 1993 average fare in each year's grouping of new Adjacent Markets.

**Hypothesis 4.4**: Between 1988 and 1993, the average fare decreased in markets among the top 3,000 airport-pairs that were neither Southwest Markets nor Adjacent Markets.

To test hypothesis 4.4, the same steps used to analyze changes in average fares for hypothesis 2.3 were followed except the definition of Non-Southwest Markets was broadened to include all airport-pairs whose length of haul was less than the longest-haul Adjacent Market.

**Stratification analysis of response in Adjacent Markets**

**General hypothesis five**: Southwest's presence is correlated with market response in Adjacent Markets.

Adjacent Markets are examined to answer two questions regarding market response in airport-pairs not served by Southwest. First, does market response in
Adjacent Markets differ from market response in either Southwest Markets or Non-Southwest Markets? Second, does a change occur in market response in Adjacent Markets after Southwest’s entry in an airport-pair? This section describes the eight hypotheses which were proposed to answer the questions regarding the possible relationship between Southwest’s presence and market response in Adjacent Markets.

**Hypothesis 5.1:** In 1993, O&D demand in Corresponding Southwest Markets was higher than the O&D demand in the respective Adjacent Markets.

To test hypothesis 5.1, the same procedure used to test hypothesis 4.1 was used, except 1993 the mean level of O&D pdew in Adjacent Markets and Corresponding Southwest Markets were computed and compared rather than mean fares.

**Hypothesis 5.2:** In 1993, O&D demand in Adjacent Markets was higher than the O&D demand in other Non-Southwest Markets.

To test hypothesis 5.2, the same procedures used to test hypothesis 4.2 were used, except 1993 mean level of O&D
pdew in Adjacent Markets and Non-Southwest Markets were computed and compared rather than mean fares.

Hypothesis 5.3: In airport-pairs adjacent to Southwest's 1989-1993 New Markets, 1993 O&D demand was higher than the O&D demand in the year prior to Southwest becoming an effective competitor.

To test hypothesis 5.3, the same steps used to test hypothesis 4.3 were followed, except the mean level of O&D pdew in the annual groupings of new Adjacent Markets were computed and compared rather than mean fares.

Hypothesis 5.4: Between 1988 and 1993, O&D demand increased in markets among the top 3,000 airport-pairs that were neither Southwest Markets nor Adjacent Markets.

To test hypothesis 5.4, the same steps used to test hypothesis 4.4 were followed, except the mean level of O&D pdew in Non-Southwest Markets in 1988 and 1993 were computed and compared rather than mean fares. The definition of Non-Southwest Markets was modified to include all markets with lengths of haul less than longest haul Adjacent Market.
Hypothesis 5.5: In 1993, market revenues in Corresponding Southwest Markets were higher than the market revenues in the respective Adjacent Markets.

To test hypothesis 5.5, the same steps used to test hypothesis 5.1 were followed, except 1993 means of market revenues in Corresponding Southwest Markets and Adjacent Markets were computed and compared rather than the mean level of O&D pdew.

Hypothesis 5.6: In 1993, market revenues in Adjacent Markets were higher than the market revenues in other Non-Southwest Markets.

To test hypothesis 5.6, the same steps used to test hypothesis 5.2 were followed, except 1993 means of market revenues in Adjacent Markets and Non-Southwest Markets were computed and compared rather than the mean level of O&D pdew.

Hypothesis 5.7: In airport-pairs adjacent to Southwest's 1989-1993 New Markets, 1993 market revenues were higher than market revenues in the year prior to Southwest becoming an effective competitor.

To test hypothesis 5.7, the same steps used to test hypothesis 5.3 were followed, except the means of market
revenues in the annual groupings of new Adjacent
Markets were computed and compared rather than the mean
level of O&D pdew.

*Hypothesis 5.8:* Between 1988 and 1993, market
revenues increased in markets among the top
3,000 airport-pairs that were neither Southwest
Markets nor Adjacent Markets.

To test hypothesis 5.8, the same steps used to test
hypothesis 5.4 were followed, except the means of market
revenues in Non-Southwest Markets were computed and
compared rather than the mean level of O&D pdew.

**Summary of Chapter Three**

The chapter has described the research methodology by
identifying the data sources and collection methods,
discussing the important assumptions, and presenting the
methods used to test each of the hypotheses. In the
following chapter, the results of the analyses are
presented.
CHAPTER IV: RESULTS OF THE ANALYSES

Introduction

Chapter Four presents the results of the analyses and commentary regarding the results' support of the hypotheses. Following a review of the preparatory steps of the analyses, the remainder of Chapter Four is divided into three major sections. The first section presents the results of the regression analyses undertaken as initial screenings of the data. Section two of the chapter provides detailed results of the stratification analysis of each hypothesis. The third section presents a summary of the findings.

Prior to conducting either the regression or stratification analyses, the Origin and Destination data was classified by market type. Using the top 3,000
airport-pairs in the continental U.S. ranked by revenues, each airport-pair in each year between 1989 and 1993 was identified as one of three types of markets — Southwest Market, Adjacent Market, or Non-Southwest Market.*

Only the Southwest Market and Adjacent Market classifications were used in the regression analyses. Southwest Markets are defined as airport-pairs in which Southwest had at least a 10.00 percent share of market revenues. Adjacent Markets are defined as airport-pairs in which one airport is served by Southwest and the other airport in the pair is within 150 air miles of another airport served by Southwest. The regression analyses also included the following market classifications: (i) Tourist market; (ii) an airport-pair involving a Slot-controlled airport; and (iii) an airport-pair involving an airline

* Capitalized terms such as Adjacent Airports, Adjacent Markets, Corresponding Southwest Markets, New Markets, Non-Southwest Markets, Southwest Airports, Southwest Markets and The Southwest Effect refer to specific concepts which: (i) are essential to the study, (ii) have precise technical meanings in the study, and (iii) are defined in the Glossary. The terms are capitalized to avoid confusion with similar sounding terms, such as adjacent airport-pair or new market, which appear in lower cases and which are generic in meaning.
Hub airport. All 3,000 airport-pairs were used in the regression analyses.

In the stratification analyses, Non-Southwest Markets were included. Non-Southwest Markets are defined as airport-pairs among the top 3,000 in the continental U.S. ranked by revenues, excluding: (a) Adjacent Markets; (b) airport-pairs in which Southwest serves both airports; and (c) airport-pairs with a length of haul greater than the longest-haul Southwest Market.

In 1993, there were 144 airport-pairs in which Southwest served both airports but did not have at least a 10.00 percent share of revenues in any of the airport-pairs, and all 144 markets were excluded from the stratification analyses. In addition, there were 275 non-Southwest airport-pairs with a length of haul greater than Southwest’s longest haul of 2,239 miles, and all 275 Non-Southwest Markets were excluded from the stratification analyses. As a result, the 1993 data set for the
stratification analyses consisted of 2,581 airport-pairs*—307 Southwest Markets, 377 Adjacent Markets and 1,897 Non-Southwest Markets.

Between 1989 and 1992, there were 85 airport-pairs that once met the requirements for classification as a Southwest Market, but were not classified as Southwest Markets at yearend 1993 because they had dropped out of the top 3,000 markets ranked by revenues in 1993. The 85 airport-pairs not ranked as Southwest Markets in 1993 were classified as Southwest Markets in the year(s) they met the requirements of the definition of a Southwest Market.

In 1993, Southwest terminated service at Detroit City Airport (DET), but no airport-pair involving DET was ranked among the top 3,000 airport-pairs in any year between 1989 and 1993.

*For the stratification analyses involving Adjacent Markets, 199 airport-pairs were added to the data set. The 199 airport-pairs had weighted average lengths of haul longer than the longest-haul Southwest Market, but less than the longest-haul Adjacent Market. As a result, the 1993 data set for the stratification analyses of Adjacent Markets consists of 2,780 airport-pairs.
Results of the regression analyses

Five regressions were undertaken — two on market structure, one on market conduct and two on market response. The regression analyses provide initial insights into The Southwest Effect. The objective of the regression analyses is not to develop predictive models of The Southwest Effect, nor is the objective of the regression analyses to test any of the 27 research hypotheses. Rather, the objective of the five regressions is to determine if there is a statistically significant relationship between Southwest's presence as an effective competitor and market structure, conduct or response.

Table 9 shows the descriptive statistics for each of the regression variables.
Table 9  Summary Statistics of Regression Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
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<tr>
<td>Dependent</td>
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<td>Average One-Way Fare</td>
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<td>52.13</td>
<td>32.08</td>
<td>422.46</td>
</tr>
<tr>
<td>Revenues per day each way</td>
<td>3,000</td>
<td>16,040</td>
<td>26,892</td>
<td>2,889</td>
<td>512,433</td>
</tr>
<tr>
<td>O&amp;D per day each way</td>
<td>3,000</td>
<td>109</td>
<td>183</td>
<td>9</td>
<td>2,248</td>
</tr>
</tbody>
</table>

| Independent                  |     |       |           |         |         |
| Average Length of Haul       | 3,000 | 1,175 | 690       | 80      | 2,840   |
| O&D per day each way         | 3,000 | 109  | 183       | 9       | 2,248   |
| Southwest Market * Haul      | 307 | 915   | 527       | 162     | 2,239   |
| Southwest Market * O&D       | 307 | 194   | 287       | 15      | 1,957   |

Based on 1993 data and market classifications.

Chapter Three discusses the possibility of endogenous variables in the regressions, the implications of endogeneity on regression coefficients, a solution for overcoming endogeneity and findings from a recent study that addressed endogeneity in regressions of airline fares.
Regression analyses of market structure

The first two regressions examine whether Southwest's presence as an effective competitor is correlated with either of the following measures of market structure: (i) the number of effective competitors, or (ii) the level of market concentration. Table 10 shows the results from the first regression of market structure, in which the number of effective competitors is the dependent variable.

Table 10 Results of First Market Structure Regression
Dependent Variable: Number of Eff. Comp.

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Coefficients</th>
<th>t Statistic</th>
<th>p-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1.8628</td>
<td>37.396</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Southwest Market (0,1)</td>
<td>-0.5229</td>
<td>-3.673</td>
<td>0.00024</td>
</tr>
<tr>
<td>Adjacent Market (0,1)</td>
<td>0.0495</td>
<td>0.890</td>
<td>0.37330</td>
</tr>
<tr>
<td>Tourist Market (0,1)</td>
<td>0.1201</td>
<td>3.154</td>
<td>0.00163</td>
</tr>
<tr>
<td>Hub Airport(s) (0,1)</td>
<td>-0.3147</td>
<td>-8.321</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Slot Airport(s) (0,1)</td>
<td>0.0197</td>
<td>0.386</td>
<td>0.69981</td>
</tr>
<tr>
<td>Average Length of Haul</td>
<td>0.0006</td>
<td>23.477</td>
<td>0.00000+</td>
</tr>
<tr>
<td>O&amp;D per day each way</td>
<td>-0.0003</td>
<td>-2.534</td>
<td>0.01132</td>
</tr>
<tr>
<td>Southwest Mkt * Haul</td>
<td>0.0009</td>
<td>7.532</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Southwest Mkt * O&amp;D</td>
<td>0.0002</td>
<td>0.946</td>
<td>0.34409</td>
</tr>
</tbody>
</table>

n = 3,000. Adjusted $R^2 = 0.239$
Table 11 shows the results from the second regression of market structure, in which the level of market concentration measured by the Herfindahl-Hirschman Index is the dependent variable.

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Coefficients</th>
<th>t Statistic</th>
<th>p-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.66985</td>
<td>66.311</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Southwest Market (0,1)</td>
<td>0.09261</td>
<td>3.208</td>
<td>0.00135</td>
</tr>
<tr>
<td>Adjacent Market (0,1)</td>
<td>-0.02091</td>
<td>-2.031</td>
<td>0.04231</td>
</tr>
<tr>
<td>Tourist Market (0,1)</td>
<td>-0.03784</td>
<td>-4.902</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Hub Airport(s) (0,1)</td>
<td>0.05046</td>
<td>6.579</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Slot Airport(s) (0,1)</td>
<td>-0.01121</td>
<td>-1.080</td>
<td>0.28001</td>
</tr>
<tr>
<td>Average Length of Haul</td>
<td>-0.00016</td>
<td>-31.925</td>
<td>0.00000+</td>
</tr>
<tr>
<td>O&amp;D per day each way</td>
<td>-0.00002</td>
<td>-0.687</td>
<td>0.49226</td>
</tr>
<tr>
<td>Southwest Mkt * Haul</td>
<td>-0.00014</td>
<td>-5.890</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Southwest Mkt * O&amp;D</td>
<td>0.00006</td>
<td>1.421</td>
<td>0.15549</td>
</tr>
</tbody>
</table>

n = 3,000  Adjusted R² = 0.322

In both regressions of market structure, the Southwest Market dummy variable is deemed to be significant and the sign of the coefficient consistent with expectations. Holding all other things equal, the regression findings suggest Southwest's presence as an effective competitor appears correlated with the net reduction of 0.52 competitors in the market. However, the coefficient of the Southwest Market*length of haul interaction term is
deemed significant and suggests the level of correlation of The Southwest Effect is not equal across markets. For example, based on the regression coefficients, the estimated number of effective competitors in Southwest Markets of 500 miles and 1,500 miles are 2.0899 and 3.5899, respectively, compared with estimated effective competitors of 2.1628 and 2.7628, respectively, in comparable airport-pairs ranked among the top 3,000 that are neither Adjacent Markets nor Southwest Markets.

The regression coefficients suggest that in markets beyond 581 miles, the average number of effective competitors in Southwest Markets is greater than the average number of effective competitors in airport-pairs ranked in the top 3,000 that are neither Adjacent Markets nor Southwest Markets. In 1993, the weighted average length of haul in all Southwest Markets was 560 miles.

It should be noted that the coefficient of the O&D pdew term does not conform with prior expectations, which might be indicative of multicollinearity among the independent
variables. Table 12 presents a correlation matrix of the independent variables.

**Table 12** Correlation Matrix of Independent Variables

<table>
<thead>
<tr>
<th></th>
<th>OD</th>
<th>Haul</th>
<th>WN</th>
<th>Tour</th>
<th>Hub</th>
<th>Slot</th>
<th>Adj</th>
<th>WNOD</th>
<th>WINHaul</th>
</tr>
</thead>
<tbody>
<tr>
<td>OD</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haul</td>
<td>-0.161</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WN</td>
<td>0.158</td>
<td>-0.127</td>
<td>1.000</td>
<td>-0.047</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tour</td>
<td>0.044</td>
<td>0.093</td>
<td>0.031</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hub</td>
<td>0.089</td>
<td>-0.059</td>
<td>-0.167</td>
<td>0.002</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slot</td>
<td>0.146</td>
<td>-0.064</td>
<td>-0.133</td>
<td>-0.102</td>
<td>-0.104</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj</td>
<td>0.006</td>
<td>0.038</td>
<td>-0.128</td>
<td>-0.104</td>
<td>0.067</td>
<td>0.037</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WNOD</td>
<td>0.507</td>
<td>-0.163</td>
<td>0.540</td>
<td>0.028</td>
<td>-0.049</td>
<td>-0.072</td>
<td>-0.069</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>WINHaul</td>
<td>0.016</td>
<td>0.018</td>
<td>0.855</td>
<td>-0.037</td>
<td>-0.112</td>
<td>-0.113</td>
<td>-0.109</td>
<td>0.262</td>
<td>1.000</td>
</tr>
</tbody>
</table>

**Key to Variable Names:**
- **OD**: Origin and Destination passengers per day each way
- **Haul**: Weighted average length of haul
- **WN**: Southwest Market
- **Tour**: Tourist market
- **Hub**: Hub airport
- **Slot**: Slot-constrained airport
- **Adj**: Adjacent Market
- **WNOD**: Southwest Market dummy times O&D pdew
- **WINHaul**: Southwest Market dummy times length of haul

Based on the low correlation values in Table 12, it appears multicollinearity is not a serious problem, and the unexpected negative sign of the coefficient of the O&D pdew term is a surprising result.
The second regression of market structure indicates most airline markets among the top 3,000 airport-pairs are relatively concentrated, with a Herfindahl-Hirschman Index of 0.66985. The regression coefficient of the Southwest Market dummy variable is deemed to be significant and the sign is consistent with expectations. The findings imply Southwest's presence as an effective competitor in the market is correlated with a 13.83 percent rise in the level of concentration. However, the coefficient for the length of haul interaction variable (i.e., Southwest Market*length of haul) suggests the level of concentration in Southwest Markets diminishes as the length of haul increases, so that in markets beyond 662 miles the level of concentration in Southwest Markets is less than the industry average.

The regression analyses suggest Southwest's presence as an effective competitor is correlated with differences in market structure. The hypothesized relationships between Southwest's presence and market structure will be explored more fully in the stratification analyses in the third section of the chapter.
Regression analysis of market conduct

The third regression looks for evidence of correlation between Southwest's presence as an effective competitor and market conduct. Table 13 shows the results of the regression of market conduct, in which the weighted average one-way fare is the dependent variable.

Table 13 Results of Regression of Market Conduct
Dependent Variable: Average One-Way Fare

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Coefficients</th>
<th>t Statistic</th>
<th>p-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>132.313</td>
<td>74.725</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Southwest Market (0,1)</td>
<td>-93.401</td>
<td>-18.457</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Adjacent Market (0,1)</td>
<td>0.022</td>
<td>0.012</td>
<td>0.99023</td>
</tr>
<tr>
<td>Tourist Market (0,1)</td>
<td>-34.243</td>
<td>-25.309</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Hub Airport(s) (0,1)</td>
<td>10.678</td>
<td>7.943</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Slot Airport(s) (0,1)</td>
<td>6.987</td>
<td>3.843</td>
<td>0.00012</td>
</tr>
<tr>
<td>Average Length of Haul</td>
<td>0.042</td>
<td>47.102</td>
<td>0.00000+</td>
</tr>
<tr>
<td>O&amp;D per day each way</td>
<td>-0.037</td>
<td>-9.425</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Southwest Mkt * Haul</td>
<td>0.037</td>
<td>9.159</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Southwest Mkt * O&amp;D</td>
<td>0.024</td>
<td>2.900</td>
<td>0.00376</td>
</tr>
</tbody>
</table>

n = 3,000. Adjusted R^2 = 0.618

The Southwest Market dummy variable is deemed to be statistically significant and the sign of the coefficient is consistent with expectations. Moreover, the regression of market conduct provides a much higher adjusted R^2 than either of the regressions of market structure (i.e., 0.618
versus 0.239 and 0.322). However, the Adjacent Market variable is deemed not to be a significant factor in explaining weighted average one-way fares, which suggests the hypothesized correlation between Southwest’s presence and conduct in Adjacent Markets does not exist.

Consistent with the findings of Borenstein and the General Accounting Office, markets involving hub airports are found to have higher one-way fares — $10.68, ceteris paribus — than airport-pairs in which neither airport is an airline hub. Weighted average one-way fares at Slot-controlled airports are estimated by the regression to be $6.99 higher than fares at other airports. On the other hand, Tourist markets are found to have weighted average one-way fares which are $34.24 lower than fares in other markets. The regression results also indicate fares in all markets increase at the rate of about $0.042 per mile, and average fares in all markets decrease by about $0.037 per O&D passenger as traffic volume increases.

The coefficient of the Southwest Market variable suggests that Southwest’s presence as an effective competitor in an
airport-pair is correlated with a reduction in the market’s weighted average one-way fare of $93.40. When length of haul is considered, the regression estimates that in markets of 500 miles and 1,500 miles, the weighted average one-way fares in Southwest Markets are $78.41 and $157.41, respectively, versus $153.31 and $195.31, respectively, in airport-pairs that are neither Southwest Markets nor Adjacent Markets.

Coefficients of the Southwest Market*length of haul and Southwest Market*O&D pdew interaction terms are deemed to be significant, and the positive signs of the coefficients suggest the estimated correlation between Southwest’s presence and weighted average one-way fares decreases as mileage and traffic density increase. Holding everything else constant, the regression coefficients suggest the disparity between fares in Southwest Markets and markets which are neither Southwest Markets nor Adjacent Markets disappears in markets beyond 2,516 miles. The longest-haul Southwest Market in 1993 was Cleveland-Oakland, a distance of 2,239 miles.
The regression of market conduct suggests a relationship might exist between Southwest's presence as an effective competitor and market conduct. However, the regression findings did not find statistical evidence of a correlation between Southwest's presence and conduct in Adjacent Markets. The hypothesized relationships between Southwest's presence as an effective competitor and market conduct will be explored more fully in the third section of the chapter.

Regression analyses of market response

The final pair of regressions look for correlation between Southwest's presence as an effective competitor and market response. The first regression of market response tests for the possibility of correlation with average market revenues per day each way (revenues pdew) in an airport-pair. The second regression of market response tests for the possibility of correlation with the number of Origin and Destination passengers per day each way (O&D pdew) in an airport-pair.
Table 14 presents the results of the first regression of market response, in which average market revenues pdew is the dependent variable.

Table 14 Results of First Regression of Market Response
Dependent Variable: Average Revenues pdew

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Coefficients</th>
<th>t Statistic</th>
<th>p-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-7,299.348</td>
<td>-12.152</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Southwest Market</td>
<td>6,808.867</td>
<td>3.966</td>
<td>0.00007</td>
</tr>
<tr>
<td>Adjacent Market</td>
<td>-299.801</td>
<td>-0.490</td>
<td>0.62422</td>
</tr>
<tr>
<td>Tourist Market</td>
<td>-2,859.515</td>
<td>-6.230</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Hub Airport(s)</td>
<td>3,399.509</td>
<td>7.455</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Slot Airport(s)</td>
<td>3,948.869</td>
<td>6.403</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Average Length of Haul</td>
<td>5.205</td>
<td>17.023</td>
<td>0.00000+</td>
</tr>
<tr>
<td>O&amp;D per day each way</td>
<td>152.918</td>
<td>115.617</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Southwest Mkt * Haul</td>
<td>-1.039</td>
<td>-0.756</td>
<td>0.44989</td>
</tr>
<tr>
<td>Southwest Mkt * O&amp;D</td>
<td>-105.187</td>
<td>-37.913</td>
<td>0.00000+</td>
</tr>
</tbody>
</table>

n = 3,000. Adjusted $R^2 = 0.835$

Table 15 presents results from the second regression of market response, in which the number of Origin and Destination passengers per day each way (O&D pdew) is the dependent variable.
Table 15  Results of Second Regression of Market Response  
Dependent Variable: Average O&D pdew

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Coefficients</th>
<th>t Statistic</th>
<th>p-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>49.419</td>
<td>5.349</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Southwest Market</td>
<td>346.239</td>
<td>16.500</td>
<td>0.00000+</td>
</tr>
<tr>
<td>(0,1) Adjacent Market</td>
<td>14.876</td>
<td>1.560</td>
<td>0.11884</td>
</tr>
<tr>
<td>Tourist Market</td>
<td>34.467</td>
<td>4.840</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Hub Airport(s)</td>
<td>60.489</td>
<td>8.615</td>
<td>0.00000+</td>
</tr>
<tr>
<td>(0,1) Slot Airport(s)</td>
<td>103.618</td>
<td>11.030</td>
<td>0.00000+</td>
</tr>
<tr>
<td>Average Length of Haul</td>
<td>-0.018</td>
<td>-3.783</td>
<td>0.00016</td>
</tr>
<tr>
<td>Southwest Mkt * Haul</td>
<td>-0.241</td>
<td>-12.609</td>
<td>0.00000+</td>
</tr>
</tbody>
</table>

n = 3,000. Adjusted R² = 0.138

In both regressions of market response, the Southwest Market dummy variable is deemed to be statistically significant, and the coefficient of the Southwest Market variable has the expected sign. However, the Adjacent Market dummy variable is deemed not statistically significant in either regression of market response. Moreover, the Southwest Market*length of haul interaction term is deemed to be significant in the second regression (i.e., dependent variable is O&D pdew), but the interaction term is deemed not to be significant in the first regression of market response (i.e., dependent variable is market revenues pdew).
The regression analyses suggest a relationship between Southwest’s presence as an effective competitor and market response in Southwest Markets. However, the adjusted $R^2$ from the two market response regressions indicate the models differ substantially in their ability to explain market response. The revenues pdew regression yields an adjusted $R^2$ of 0.835, while the O&D pdew regression has an adjusted $R^2$ of only 0.138.

Based on the findings from the first regression of market response, Southwest’s presence as an effective competitor in an airport-pair appears to be correlated with an estimated increase in the market’s average revenues pdew of $6,808.87. Based on the results from the second regression of market response, Southwest’s presence as an effective competitor appears to be correlated with an estimated increase in the average number of O&D passengers per day each way of 346.2. However, in Southwest Markets of 500 miles and 1,500 miles with an average of 195 Origin and Destination passengers per day each — the weighted average in Southwest Markets in 1993 — the estimated revenues pdew are $11,419 and $16,624, respectively. By
comparison, in airport-pairs that are neither
Adjacent Markets nor Southwest Markets, the estimated
revenues pdeW in markets with 195 O&D pdeW and lengths of
haul of 500 miles and 1,500 miles, are $25,122 and
$30,327, respectively.

The regression findings initially suggest a relationship
might exist between Southwest's presence as an effective
competitor and market response. However, the regressions
do not find statistical evidence of a correlation between
Southwest's presence and market response in Adjacent
Markets. The stratification analyses later in the chapter
will more closely examine the hypothesized relationships
between Southwest's presence as an effective competitor
and market response.
Summary of regression analyses

The regression analyses were designed to provide initial statistical screenings of the top 3,000 airport-pairs to determine if there was a correlation between Southwest's presence and market structure, conduct or response. Results from the five regressions — two of market structure, one of market conduct and two of market response — have been presented. In both regressions of market structure (i.e., number of effective competitors and Herfindahl-Hirschman Index), the Southwest Market dummy variable is deemed to be significant and consistent with expectations. Southwest Markets are estimated to be correlated with 0.52 fewer effective competitors and to be correlated with a 13.83 percent increase in market concentration vis-à-vis airport-pairs that are neither Southwest Markets nor Adjacent Markets. The results of the regressions initially suggest a relationship exists between Southwest's presence as an effective competitor and market structure.
The regression of market conduct reveals that Southwest's presence as an effective competitor is correlated with a reduction in the market's weighted average fare of $93.40, which is consistent with the hypothesized correlation between Southwest's presence and market conduct in Southwest Markets. However, the regression analysis also suggests the estimated relationship between Southwest's presence and market conduct decreases with distance in Southwest Markets. The regression analysis does not provide statistical evidence of the hypothesized relationship between Southwest's presence and conduct in Adjacent Markets.

In the regressions of market response, Southwest's presence as an effective competitor is estimated to be correlated with an increase in traffic volume of 346.2 O&D pdew and an increase in revenues pdew of $6,808.87. Both findings suggest a correlation between Southwest's presence as an effective competitor and market response. However, the regressions do not provide statistical support for the hypothesized relationship between Southwest's presence and response in Adjacent Markets.
Based on concerns about endogeneity in the regressions and the desire to present findings in a manner consistent with prior studies and industry convention, detailed stratification analyses of Southwest’s hypothesized correlation with market structure, conduct and response were undertaken. The results of the stratification analyses, which can be used to validate the regression findings, are discussed in the following section.

**Results of the stratification analyses**

The stratification analysis is based on a smaller data set than the regression analyses. The latter includes all of the airport-pairs ranked in the top 3,000 markets in the continental U.S. based on revenues per day each way. The 1993 data set for the stratification analyses consists of 2,581 airport-pairs and classifies each airport-pair as follows — Southwest Markets, Adjacent Markets, or Non-Southwest Markets. The definitions of Southwest Markets
and Adjacent Markets for the stratification analyses are the same as those used in the regression analyses.

For the stratification analyses, Non-Southwest Markets are defined to include only airport-pairs ranked in the top 3,000 markets that are neither Southwest Markets nor Adjacent Markets and that meet the following conditions: (i) neither airport in the Non-Southwest Market pair is served by Southwest; (ii) the longest-haul Non-Southwest Market has a length of haul no greater than the longest-haul Southwest Market.

The 1993 data set for the stratification analyses consists of 307 Southwest Markets, 377 Adjacent Markets and 1,897 Non-Southwest Markets. Table 16 shows the stratification of the Southwest Markets and the Non-Southwest Markets by length of haul and traffic density. Length of haul stratifications are Short-Haul (under 500 miles), Medium-Haul (501-1,500 miles) and Long-Haul (over 1,500 miles).

* In the stratification analyses of Adjacent Markets, the definition of Non-Southwest Markets is modified to include Non-Southwest Markets with lengths of haul longer than the longest-haul Southwest Market up to the longest-haul Adjacent Market, which adds 199 airport-pairs to the data set.
Traffic density is the total number of Origin and Destination passengers per day each way (O&D pdew) in the airport-pair. Weights in the calculation of the weighted average length of haul in each stratification are based on the number of O&D passengers.

**Table 16 Stratification of Top Revenue Markets In Continental U.S.**

<table>
<thead>
<tr>
<th>1993 Market Stratification</th>
<th>Southwest Markets</th>
<th>Non-Southwest Mkts</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Mkt.</td>
<td>Percent Of Total</td>
<td>Wt. Avg. Haul*</td>
<td># of Mkt.</td>
<td>Percent Of Total</td>
<td>Wt. Avg. Haul*</td>
<td></td>
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<tr>
<td><strong>Short-haul</strong></td>
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<tr>
<td>1-50 O&amp;D</td>
<td>3</td>
<td>414</td>
<td>152</td>
<td>322</td>
<td></td>
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<tr>
<td>51-150 O&amp;D</td>
<td>21</td>
<td>383</td>
<td>112</td>
<td>318</td>
<td></td>
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</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>66</td>
<td>316</td>
<td>68</td>
<td>315</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Sub-totals</td>
<td>92</td>
<td>320</td>
<td>332</td>
<td>316</td>
<td></td>
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<tr>
<td><strong>Medium-haul</strong></td>
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<tr>
<td>1-50 O&amp;D</td>
<td>57</td>
<td>1,054</td>
<td>703</td>
<td>959</td>
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<td></td>
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<tr>
<td>51-150 O&amp;D</td>
<td>65</td>
<td>858</td>
<td>300</td>
<td>922</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>35</td>
<td>873</td>
<td>228</td>
<td>923</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-totals</td>
<td>157</td>
<td>889</td>
<td>1,231</td>
<td>55.85%</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Long-haul</strong></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>37</td>
<td>1,733</td>
<td>239</td>
<td>1,855</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>15</td>
<td>1,700</td>
<td>67</td>
<td>1,870</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>6</td>
<td>1,667</td>
<td>28</td>
<td>1,732</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-totals</td>
<td>58</td>
<td>1,700</td>
<td>334</td>
<td>15.15%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td>307</td>
<td>13.93%</td>
<td>560</td>
<td>1,897</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Wt. Avg. Haul is the weighted average length of haul based on all passengers in all markets in each stratification.
The results of the initial stratification of the top airport-pairs in the continental U.S. reveal Southwest is an effective competitor in a relatively small proportion of the markets — only 13.93 percent. The analysis also reveals Southwest’s presence as an effective competitor tends to be concentrated in short-haul and medium-haul markets. The majority of Southwest Markets fall into one of three stratifications — high-density short-haul markets; medium-density medium-haul markets; and low-density medium-haul markets. Long-haul markets account for less than three percent of the total markets where Southwest is an effective competitor.

It is worth noting that Southwest’s weighted average length of haul is only 560 miles compared to 893 miles in the 1,897 Non-Southwest Markets. In short-haul markets, Southwest’s weighted average length of haul of 320 miles is nearly identical to the weighted average length of haul in short-haul Non-Southwest Markets. Southwest’s medium-haul weighted average haul of 889 miles is within five percent of the Non-Southwest weighted average, while Southwest’s long-haul weighted average haul is
approximately six percent less the Non-Southwest weighted average. In the analyses to follow, reference will be made to such differences in the weighted average length of haul when their impact on the reported findings could be a factor.

The results of the stratification analyses are presented in the following format: (i) a restatement of the research questions and the general hypothesis; (ii) a statement of the specific hypothesis; (iii) a table containing the research findings; (iv) a conclusion stating whether the hypothesis is deemed to be supported by the results; and (v) a commentary on the findings.

**General hypothesis one**

The stratification analysis seeks to answer two questions regarding a hypothesized relationship between Southwest's presence and market structure. First, do Southwest Markets have a different structure than airport-pairs in which Southwest is not an effective competitor? Second, does a change
in market structure occur after Southwest’s entry in an airport-pair market? Market structure is measured by the average number of effective competitors and by the Herfindahl-Hirschman Index.

**General hypothesis one:** The structure of airport-pair markets is correlated with Southwest’s presence.

**Results of the test of hypothesis 1.1.**

*Hypothesis 1.1:* In airport-pair markets with comparable lengths of haul and traffic densities, the number of effective competitors tended to be higher in airport-pair markets where Southwest was not an effective competitor in 1993.

Table 17 shows the average number of effective competitors in the top airport-pairs in the continental U.S.
Table 17  Competitors in Southwest vs. Non-Southwest Markets

<table>
<thead>
<tr>
<th>1993 Market Stratifications</th>
<th>Southwest Markets</th>
<th>Non-Southwest Markets</th>
<th>Southwest as Percent of Non-Southwest</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Short-haul</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>3</td>
<td>2.667</td>
<td>152</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>21</td>
<td>1.667</td>
<td>112</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>68</td>
<td>1.559</td>
<td>68</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>92</td>
<td>1.620</td>
<td>332</td>
</tr>
<tr>
<td><strong>Medium-haul</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>57</td>
<td>3.088</td>
<td>703</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>65</td>
<td>2.646</td>
<td>300</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>35</td>
<td>2.000</td>
<td>228</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>157</td>
<td>2.662</td>
<td>1,231</td>
</tr>
<tr>
<td><strong>Long-haul</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>37</td>
<td>3.649</td>
<td>239</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>15</td>
<td>3.867</td>
<td>67</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>6</td>
<td>3.000</td>
<td>28</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>58</td>
<td>3.638</td>
<td>334</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td>307</td>
<td>2.530</td>
<td>1,897</td>
</tr>
</tbody>
</table>

Conclusion: Hypothesis 1.1 is not supported.

Comment on results: The average number of effective competitors is higher in Southwest Markets in seven of the nine market stratifications. In two of the three most important market stratifications for Southwest — medium-density medium-haul and low-density medium-haul markets, which account for 39.74 percent of Southwest's Markets —
the average number of effective competitors is at least 20 percent higher in Southwest Markets. In low-density medium-haul Southwest Markets, there is an average of 0.528 more effective competitors in Southwest Markets. In medium-density medium-haul markets, there is an average of 0.516 more effective competitors in Southwest Markets.

In the two market stratifications where the number of effective competitors is less in Southwest Markets than in Non-Southwest Markets, the differences are not very large. In high-density short-haul markets, the difference is less than ten percent, and in high-density medium-haul markets the difference is less than two percent. These two market stratifications account for 33.55 percent of Southwest’s total markets.

A market-by-market examination of the 68 Southwest Markets in the high-density short-haul stratification — the only stratification in which there are significantly fewer competitors in Southwest Markets — reveals that 13 of the 68 airport-pairs involve service from Dallas Love Field (DAL), an airport served exclusively by Southwest under
the terms of the Wright Amendment. In the 13 markets, Southwest has a 100.00 percent share of the market, and Southwest is the only effective competitor in each of the 13 airport-pairs involving DAL. All 13 markets are among the top 16 largest revenue markets for Southwest.

In both Southwest Markets and Non-Southwest Markets, the number of effective competitors tends to increase as length of haul increases. For example, short-haul markets average about one-and-one-half effective competitors, and medium-haul markets average about two-and-one-half effective competitors in both Southwest Markets and in Non-Southwest Markets. In long-haul markets, the number of effective competitors increases to 3.638 in Southwest Markets, and rises to an average of 2.751 effective competitors in Non-Southwest Markets.

In none of the nine stratifications of Non-Southwest Markets does the average number of effective competitors exceed 3.000. However, in four stratifications of Southwest Markets, which account for 37.46 percent of Southwest Markets, the average number of effective
competitors exceeds 3.000. Moreover, in four stratifications of Non-Southwest Markets, which account for 18.98 percent of all Non-Southwest Markets, the average number of effective competitors is less than 2.000. In only two market stratifications of Southwest Markets, which account for 28.99 percent of Southwest Markets, are the average number of effective competitors less than 2.000.

In most stratifications of Southwest Markets, the average number of effective competitors tends to decrease as traffic density increases. For example, in both short-haul and medium-haul Southwest Markets, the average number of effective competitors decreases by at least 1.000 as traffic density increases from low-density to high-density. In Southwest’s long-haul markets, the average number of effective competitors in low-density markets is 3.649 compared with 3.000 in high-density long-haul markets.

By comparison, the average number of effective competitors in Non-Southwest Markets increases as traffic density increases in short-haul markets, and falls as traffic
density increases in medium-haul and long-haul markets. In medium-haul Non-Southwest Markets, the average number of effective competitors drops by about one-half of a competitor, and in long-while markets the average number of effective competitors decreases by almost one full competitor as traffic density increases.

Overall, the average number of effective competitors in all Southwest Markets is 2.530, which is 11.40 percent greater than the average of 2.271 effective competitors in Non-Southwest Markets. The stratification analysis reveals that the number of effective competitors tends to be higher in Southwest Markets than in Non-Southwest Markets. The findings are deemed to not support hypothesis 1.1, which posits that the number of effective competitors is higher in markets in which Southwest is not an effective competitor.
Results of the test of hypothesis 1.2

Hypothesis 1.2: In airport-pair markets with comparable lengths of haul and traffic densities, the level of concentration tended to be lower in airport-pairs where Southwest was not an effective competitor in 1993.

Table 18 shows the average level of market concentration measured by the Herfindahl-Hirschman Index in the top airport-pairs in the continental U.S..

Table 18  Herf.-Hirsch. Index in Southwest and Non-Southwest Markets

<table>
<thead>
<tr>
<th>1993 Market Stratifications</th>
<th>Southwest Markets</th>
<th>Non-Southwest Mkts</th>
<th>Southwast as a Percent of Non-Southwest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># Of Mkts.</td>
<td>Herfindahl-Hirschman</td>
<td># Of Mkts.</td>
</tr>
<tr>
<td>Short-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>3</td>
<td>0.39031</td>
<td>152</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>21</td>
<td>0.68273</td>
<td>112</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>68</td>
<td>0.75898</td>
<td>68</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>92</td>
<td>0.72955</td>
<td>332</td>
</tr>
<tr>
<td>Medium-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>57</td>
<td>0.38090</td>
<td>703</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>65</td>
<td>0.47541</td>
<td>300</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>35</td>
<td>0.58210</td>
<td>228</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>157</td>
<td>0.46488</td>
<td>1,231</td>
</tr>
<tr>
<td>Long-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>37</td>
<td>0.31530</td>
<td>239</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>15</td>
<td>0.27311</td>
<td>67</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>6</td>
<td>0.30265</td>
<td>28</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>58</td>
<td>0.30308</td>
<td>334</td>
</tr>
<tr>
<td>TOTALS</td>
<td>307</td>
<td>0.51363</td>
<td>1,897</td>
</tr>
</tbody>
</table>
Conclusion: Hypothesis 1.2 is not supported.

Comment on findings: The Herfindahl-Hirschman Index is directly related to the level of market concentration — a low-level of market concentration is reflected in a relatively small Herfindahl-Hirschman Index. In both Southwest Markets and Non-Southwest Markets, the mean Herfindahl-Hirschman Index tends to decrease as length of haul increases. Moreover, high-density markets generally tend to be more concentrated (i.e., have a higher Herfindahl-Hirschman Index) than low-density markets.

In seven of the nine market stratifications, the level of market concentration is lower in Southwest Markets than in Non-Southwest Markets. In two of Southwest’s three largest market stratifications — low-density medium-haul and medium-density medium-haul markets — the level of market concentration is at least ten percent lower in Southwest Markets than in Non-Southwest Markets. In only two of the nine market stratifications do Southwest Markets have higher levels of market concentration than the comparable Non-Southwest Markets.
Overall, the mean level of market concentration measured by the Herfindahl-Hirschman Index is 0.51363 in Southwest Markets versus 0.52044 in Non-Southwest Markets, a difference of less than two percent. Results from the stratification analysis are deemed to not support hypothesis 1.2 which posits that the level of concentration is lower in markets where Southwest is not an effective competitor.

Results of the test of hypothesis 1.3.

Hypothesis 1.3: In Southwest's 1989-1993 New Markets, the number of effective competitors decreased from the year prior to Southwest's entry to 1993.

New Markets are defined as airport-pairs ranked among the top 3,000 in the continental U.S. in 1993 in which: (a) Southwest became an effective competitor between 1989 and 1993, and (b) Southwest was still an effective competitor in 1993. The 107 New Markets account for 34.85 percent of the 307 Southwest Markets.
Table 19 shows the number of effective competitors in the New Markets in the year prior to Southwest's entry and in 1993.

Table 19 Effective Competitors In Southwest’s New Markets

<table>
<thead>
<tr>
<th>Southwest’s Year of Entry</th>
<th>Number of New Markets</th>
<th>Number of Effective Competitors</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Year Prior To Entry</td>
<td>1993</td>
</tr>
<tr>
<td>1989</td>
<td>31</td>
<td>2.806</td>
<td>2.871</td>
</tr>
<tr>
<td>1990</td>
<td>19</td>
<td>2.368</td>
<td>2.474</td>
</tr>
<tr>
<td>1991</td>
<td>15</td>
<td>2.800</td>
<td>3.200</td>
</tr>
<tr>
<td>1992</td>
<td>20</td>
<td>2.300</td>
<td>2.800</td>
</tr>
<tr>
<td>1993</td>
<td>22</td>
<td>2.091</td>
<td>2.818</td>
</tr>
<tr>
<td>AVERAGES</td>
<td>21.4</td>
<td>2.486</td>
<td>2.822</td>
</tr>
</tbody>
</table>

Conclusion: Hypothesis 1.3 is not supported.

Comment on findings: There are 107 New Markets, an average of 21.4 per year. In the 50 New Markets Southwest entered in 1989 and 1990, the number of effective competitors essentially was the same in 1993 as in the year prior to Southwest's entry. In the 57 New Markets entered by Southwest from 1991 through 1993, the number of effective competitors at yearend 1993 was higher than the number of effective competitors in the markets in the year prior to Southwest’s entry.
In the 22 New Markets entered in 1993, the number of effective competitors had risen 34.77 percent to 2.818 from the 1992 level. In the 20 New Markets entered in 1992, the number of effective competitors increased 21.74 percent between 1991 and 1993. In the 15 New Markets entered in 1991, the number of effective competitors rose 14.29 percent between 1990 and 1993.

Overall, the number of effective competitors in New Markets increased 13.52 percent from an average of 2.486 in the years prior to Southwest’s entry to an average of 2.822 in 1993. The research findings are deemed to not support hypothesis 1.3 which posits that the number of effective competitors decreases after Southwest enters an airport-pair market.
Results of the test of hypothesis 1.4

**Hypothesis 1.4:** In Southwest’s 1989-1993 New Markets, the level of concentration increased from the year prior to Southwest’s entry to 1993.

Table 20 shows the level of market concentration measured by the Herfindahl-Hirschman Index in Southwest’s New Markets.

**Table 20** Herf.-Hirsch. Index In Southwest’s New Markets

<table>
<thead>
<tr>
<th>Southwest’s Year of Entry</th>
<th>Number of New Markets</th>
<th>Herfindahl-Hirschman Index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Year Prior To Entry</td>
</tr>
<tr>
<td>1989</td>
<td>31</td>
<td>0.42813</td>
</tr>
<tr>
<td>1990</td>
<td>19</td>
<td>0.48734</td>
</tr>
<tr>
<td>1991</td>
<td>15</td>
<td>0.45997</td>
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<tr>
<td>1992</td>
<td>20</td>
<td>0.43718</td>
</tr>
<tr>
<td>1993</td>
<td>22</td>
<td>0.58504</td>
</tr>
<tr>
<td>AVERAGES</td>
<td>21.4</td>
<td>0.47706</td>
</tr>
</tbody>
</table>

**Conclusion:** Hypothesis 1.4 is not supported.

**Comment on findings:** In the 65 New Markets entered by Southwest in 1989 through 1991, the level of market concentration changed less than four percent between the years prior to Southwest’s entry and 1993. On the other
hand, in the 42 New Markets entered by Southwest in 1992 and 1993, the level of market concentration decreased by 19.07 percent in the 1992 markets and by 29.97 percent in the 1993 markets.

Overall, the level of market concentration measured by the Herfindahl-Hirschman Index decreased 11.36 percent from an average of 0.47706 in the years prior to Southwest's entry to 0.42287 in 1993. The observed decline in the level of market concentration in New Markets is deemed to not support hypothesis 1.4 which posits that the level of market concentration increases after Southwest enters an airport-pair market.

_Results of the test of hypothesis 1.5_

_Hypothesis 1.5:_ Between 1988 and 1993, the number of effective competitors decreased in markets among the top 3,000 airport-pairs where Southwest was not an effective competitor.

Table 21 compares the mean number of effective competitors in Non-Southwest Markets in 1988 and in 1993.
Table 21  Effective Competitors In Non-Southwest Markets

<table>
<thead>
<tr>
<th>Market Stratifications</th>
<th>1986</th>
<th>1993</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>203</td>
<td>1.616</td>
<td>152</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>177</td>
<td>1.633</td>
<td>112</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>104</td>
<td>2.144</td>
<td>68</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>484</td>
<td>1.736</td>
<td>332</td>
</tr>
<tr>
<td>Medium-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>827</td>
<td>2.680</td>
<td>703</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>351</td>
<td>2.393</td>
<td>300</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>190</td>
<td>2.189</td>
<td>228</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>1,368</td>
<td>2.538</td>
<td>1,231</td>
</tr>
<tr>
<td>Long-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>283</td>
<td>3.064</td>
<td>239</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>85</td>
<td>2.812</td>
<td>67</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>22</td>
<td>2.136</td>
<td>28</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>390</td>
<td>2.956</td>
<td>334</td>
</tr>
<tr>
<td>TOTALS</td>
<td>2,086</td>
<td>2.435</td>
<td>1,897</td>
</tr>
</tbody>
</table>

Conclusion: Hypothesis 1.5 is supported.

Comment on findings: The number of effective competitors decreased in all market stratifications and in total between 1988 and 1993. The largest percentage change, 19.73 percent, occurred in the high-density short-haul market stratification, which accounted for just 3.58 percent of all Non-Southwest Markets in 1993. In five of
the nine market stratifications, which accounted for 66.68 percent of all Non-Southwest Markets in 1993, the percentage change in the number of effective competitors was less than ten percent between 1988 and 1993.

In the short-haul stratification, the average number of effective competitors decreased 15.32 percent from 1.736 in 1988 to 1.470 in 1993. In the medium-haul and long-haul stratifications, the decreases were much smaller. The average number of effective competitors in medium-haul Non-Southwest Markets decreased 7.13 percent to 2.357 in 1993 from 2.538 in 1988. In long-haul Non-Southwest Markets, the average number of effective competitors decreased 6.94 percent from 2.956 in 1988 to 2.751 in 1993.

In 1988, the number of effective competitors increased as traffic density increased in short-haul markets and decreased as traffic density increased in medium-haul and long-haul markets. The same patterns were observed in the 1993 market stratifications. In both 1988 and in 1993, the number of effective competitors increased as the length of haul increased, rising from less than two in
short-haul markets to nearly three competitors in long-haul markets.

In 1988, only two stratifications — low-density short-haul and medium-density short-haul markets which accounted for 16.81 percent of total Non-Southwest Markets in 1988 — had less than two effective competitors. By 1993, four market stratifications — all three short-haul stratifications and high-density long-haul markets, which combined accounted for 18.98 percent of all Non-Southwest Markets in 1993 — had less than two effective competitors. In 1993, the market stratification with the most effective competitors was the low-density long-haul market, although the level had fallen to 2.837 from the 1988 level of 3.067. The low-density long-haul stratification was the only one with more than three effective competitors in 1988.

Overall, the average number of effective competitors in Non-Southwest Markets in 1993 was 2.271, which was 6.74 percent fewer than the average of 2.435 effective competitors in Non-Southwest Markets in 1988. Findings
from the stratification analysis are deemed to support hypothesis 1.5 which posits that the average number of effective competitors in Non-Southwest Markets decreased between 1988 and 1993.

Results of the test of hypothesis 1.6

Hypothesis 1.6: Between 1988 and 1993, the level of concentration increased in markets among the top 3,000 airport-pairs where Southwest was not an effective competitor.

Table 22 shows the average Herfindahl-Hirschman Index in Non-Southwest Markets in 1988 and in 1993.
Table 22 Herf.-Hirsch. Index In Non-Southwest Markets

<table>
<thead>
<tr>
<th>Market Stratifications</th>
<th>1988</th>
<th>1993</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Mkt.</td>
<td>Herfindahl-Hirschman</td>
<td># of Mkt.</td>
</tr>
<tr>
<td><strong>Short-haul</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 Q&amp;D</td>
<td>203</td>
<td>0.70435</td>
<td>152</td>
</tr>
<tr>
<td>51-150 Q&amp;D</td>
<td>177</td>
<td>0.71783</td>
<td>112</td>
</tr>
<tr>
<td>Over 150 Q&amp;D</td>
<td>104</td>
<td>0.55125</td>
<td>68</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>484</td>
<td>0.67638</td>
<td>332</td>
</tr>
<tr>
<td><strong>Medium-haul</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 Q&amp;D</td>
<td>827</td>
<td>0.42024</td>
<td>703</td>
</tr>
<tr>
<td>51-150 Q&amp;D</td>
<td>351</td>
<td>0.45912</td>
<td>300</td>
</tr>
<tr>
<td>Over 150 Q&amp;D</td>
<td>190</td>
<td>0.46891</td>
<td>228</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>1,368</td>
<td>0.43698</td>
<td>1,231</td>
</tr>
<tr>
<td><strong>Long-haul</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 Q&amp;D</td>
<td>283</td>
<td>0.33481</td>
<td>239</td>
</tr>
<tr>
<td>51-150 Q&amp;D</td>
<td>85</td>
<td>0.33040</td>
<td>67</td>
</tr>
<tr>
<td>Over 150 Q&amp;D</td>
<td>22</td>
<td>0.40928</td>
<td>28</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>390</td>
<td>0.33805</td>
<td>334</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td>2,086</td>
<td>0.47437</td>
<td>1,897</td>
</tr>
</tbody>
</table>

Conclusion: Hypothesis 1.6 is supported.

Comment on findings: The level of market concentration measured by the Herfindahl-Hirschman Index increased in all market stratifications and in total between 1988 and 1993. In the single largest market stratification — low-density medium-haul markets which accounted for 37.06 percent of all Non-Southwest Markets in 1993 — the
increase in market concentration was 7.90 percent, the smallest increase among the nine market stratifications. In high-density short-haul markets, the Herfindahl-Hirschman Index increased by 26.36 percent, the largest increase among the nine market stratifications.

Generally, in both 1988 and 1993, the level of market concentration tended to decrease as traffic density increased in short-haul markets and to increase with traffic density in medium-haul and long-haul markets. In both 1988 and 1993, the level of market concentration tended to decrease as length of haul increased, with the largest decrease in the Herfindahl-Hirschman Index occurring between short-haul and medium-haul markets. In both 1988 and 1993, the least concentrated market stratification was the medium-density long-haul market and the most concentrated stratification was the medium-density short-haul market.

Between 1988 and 1993, the average level of market concentration increased 14.10 percent in short-haul Non-Southwest Markets, rose 11.48 percent in medium-haul Non-Southwest Markets, and increased 16.38 percent in long-
haul Non-Southwest Markets. Overall, the level of market concentration in Non-Southwest Markets increased 9.71 percent from 0.47437 in 1988 to 0.52044 in 1993. Results from the stratification analysis are deemed to support hypothesis 1.6 which posits that the average level of market concentration measured by the Herfindahl-Hirschman Index increased between 1988 and 1993.

General hypothesis two

The analysis of market conduct attempts to answer two questions. First, do Southwest Markets exhibit a different conduct than airport-pairs in which Southwest is not an effective competitor? Second, does a change in conduct occur after Southwest’s entry in an airport-pair market?

General hypothesis two: The conduct of carriers in airport-pair markets is correlated with Southwest’s presence.
Market conduct is measured by one variable — the weighted average one-way fare collected by all carriers competing in the airport-pair. Because it is based on the average of all carriers in the market, the weighted average fare might not capture the full impact, if any, of the relationship between Southwest’s entry and market response. For example, Southwest promotes itself as "The Low-Fare Carrier", which, if true, would lower the average of all fares in the markets Southwest serves even if other carriers do not change their fares.

To isolate the separate effects of Southwest’s fares and the fares charged by competing carriers, the stratification analyses of market conduct show average fares in Southwest Markets in two ways. One weighted average fare is computed by including Southwest’s fare in the market average. A second weighted average fare is computed by excluding Southwest’s fare in the calculation of the market average.

Table 23 compares weighted average one-way fares in Southwest Markets when Southwest’s fare is included and
when Southwest’s average fare is excluded from the calculation of the weighted average fare of all carriers in Southwest Markets.

Table 23  Weighted Average One-Way Fares In Southwest Markets

<table>
<thead>
<tr>
<th>1993 Market Stratifications</th>
<th>Including Southwest</th>
<th>Excluding Southwest</th>
<th>Fares With Southwest as a Percent of Fares Without</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>$ 94.82</td>
<td>$ 147.25</td>
<td>64.39%</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>$ 66.50</td>
<td>$ 95.22</td>
<td>69.84%</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>$ 48.27</td>
<td>$ 67.63</td>
<td>71.37%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>$ 49.35</td>
<td>$ 69.60</td>
<td>70.91%</td>
</tr>
<tr>
<td>Medium-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>$ 130.55</td>
<td>$ 155.52</td>
<td>83.94%</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>$ 105.30</td>
<td>$ 123.66</td>
<td>85.15%</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>$ 88.61</td>
<td>$ 105.63</td>
<td>83.89%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>$ 98.94</td>
<td>$ 117.90</td>
<td>83.92%</td>
</tr>
<tr>
<td>Long-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>$ 173.13</td>
<td>$ 188.27</td>
<td>91.96%</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>$ 165.49</td>
<td>$ 177.45</td>
<td>93.26%</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>$ 158.02</td>
<td>$ 163.69</td>
<td>96.54%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>$ 165.47</td>
<td>$ 176.36</td>
<td>93.83%</td>
</tr>
<tr>
<td>TOTALS</td>
<td>$ 70.06</td>
<td>$ 88.88</td>
<td>78.83%</td>
</tr>
</tbody>
</table>

The results in Table 23 appear to support Southwest’s reputation as a low-fare carrier. However, while the average fare in Southwest Markets when Southwest’s fares are included is more than 20 percent lower than the average fare in Southwest Markets when Southwest’s fares
are excluded ($70.06 versus $88.88), the disparity decreases as length of haul increases. The average short-haul fare in Southwest Markets when Southwest’s fares are included is 29.09 percent less than when Southwest’s fares are excluded. The average medium-haul fare in Southwest Markets when Southwest’s fares are included is 16.08 percent less than the average fare when Southwest’s fares are excluded, but the average long-haul fare is only 6.17 percent less when Southwest’s fares are included. The findings are consistent with the results of the regression analysis of market conduct.

Results of the test of hypothesis 2.1

Hypothesis 2.1: In airport-pairs with comparable traffic densities and lengths of haul, 1993 average fares in markets where Southwest was not an effective competitor were higher than the average fares in markets where Southwest was an effective competitor.

Table 24 shows weighted-average one-way fares in the top airport-pairs in the continental U.S.
### Table 24  Fare Comparisons, Including Southwest's Fare

<table>
<thead>
<tr>
<th>1993 Market Stratifications</th>
<th>Southwest Markets, Including Southwest</th>
<th>Non-Southwest Markets</th>
<th>Southwest Fares as a Percent of Non-Southwest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>414</td>
<td>$ 94.82</td>
<td>322</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>383</td>
<td>$ 66.50</td>
<td>318</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>316</td>
<td>$ 48.27</td>
<td>315</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>320</td>
<td>$ 49.35</td>
<td>316</td>
</tr>
<tr>
<td>Medium-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>1,054</td>
<td>$ 130.55</td>
<td>959</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>858</td>
<td>$ 105.30</td>
<td>922</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>873</td>
<td>$ 88.61</td>
<td>923</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>889</td>
<td>$ 98.94</td>
<td>928</td>
</tr>
<tr>
<td>Long-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>1,733</td>
<td>$ 173.13</td>
<td>1,855</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>1,700</td>
<td>$ 165.49</td>
<td>1,870</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>1,667</td>
<td>$ 158.02</td>
<td>1,732</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>1,700</td>
<td>$ 165.47</td>
<td>1,811</td>
</tr>
<tr>
<td>TOTALS</td>
<td>560</td>
<td>$ 70.06</td>
<td>893</td>
</tr>
</tbody>
</table>

* Wt. Avg. Haul is the weighted average length of haul based on all passengers in all markets in each stratification.

* Wt. Avg. Fare is the weighted average one-way fare based on all passengers in all markets in each stratification.

**Conclusion:** Hypothesis 2.1 is supported.

**Comment on findings:** In markets with comparable lengths of haul and traffic densities, fares in Southwest Markets are well below average fares in Non-Southwest...
Markets. In seven of the nine market 
stratifications, which account for 83.06 percent of 
Southwest Markets, fares in Southwest Markets are at least 
20 percent lower. In three of the market stratifications, 
fares in Southwest Markets are at least 40 percent below 
the average fares in comparable Non-Southwest Markets.

The greatest disparities are observed in short-haul 
markets. On average, short-haul fares in Southwest 
Markets are just 38.49 percent of the average fares in 
comparable Non-Southwest Markets. In medium-density 
short-haul and high-density short-haul markets, fares in 
Southwest Markets are 50.00 and 39.65 percent, 
respectively, of the weighted average fares in comparable 
Non-Southwest Markets.

Not surprisingly, in both Southwest Markets and Non-
Southwest Markets, the weighted average fare increases as 
length of haul increases. For example, the weighted 
average fare in Southwest Markets increases 100.49 percent 
from $49.35 in short-haul markets to $98.94 in medium-haul 
markets, and rises 67.24 percent from $98.94 in medium-
haul to $165.47 in long-haul markets.
Although average fares in Southwest Markets are consistently lower than average fares in comparable Non-Southwest Markets, the disparity between average fares in Southwest Markets and average fares in Non-Southwest Markets decreases noticeably as length of haul increases. For example, short-haul fares in Southwest Markets are 38.49 percent of average short-haul fares in Non-Southwest Markets (i.e., $49.38 versus $128.21), but average long-haul fares in Southwest Markets are only 80.42 percent of comparable long-haul fares in Non-Southwest Markets (i.e., $165.47 versus $205.76).

Within each length of haul stratification of Southwest Markets, the weighted average fare decreases as traffic density increases. In short-haul and medium-haul Non-Southwest Markets, average fares decrease as traffic density increases, but there is very little change in average fares in long-haul Non-Southwest Markets as traffic density increases. Moreover, within each length of haul stratification, the ratio of fares in Southwest Markets to fares in Non-Southwest Markets tends to decrease as traffic density increases. For example, in
medium-haul Southwest Markets, average fare in low-density, medium-density and high-density markets are 76.12 percent, 65.72 percent and 55.92 percent, respectively, of fares in comparable Non-Southwest Markets.

The regression analyses suggested that airline fares are correlated with length of haul. Therefore, fare comparisons must consider differences in length of haul, and some of the observed differences in fares between Southwest Markets and Non-Southwest Markets probably are attributable to differences in lengths of haul. For example, in all three long-haul market stratifications, the weighted average length of haul in Southwest Markets is less than the weighted average length of haul in long-haul Non-Southwest Markets with comparable traffic densities.

The differences in length of haul between Southwest Markets and Non-Southwest Markets range from 3.75 percent in high-density long-haul markets to 9.09 percent in medium-density long-haul markets. Given that the weighted average length of haul in all long-haul Southwest Markets is 6.13 percent less than the weighted average length of
haul in long-haul Non-Southwest Markets — 1,700 miles versus 1,811 miles — it is not surprising that long-haul fares in Southwest Markets are lower. However, within each long-haul stratification, the difference in fares is greater than the difference in length of haul.

Within the long-haul stratifications of traffic density, fares in Southwest Markets range from 15.92 percent to 24.75 percent less than the average fares in comparable Non-Southwest Markets. Overall, the weighted average length of haul and weighted average fare in long-haul Southwest Markets are 6.13 percent and 19.58 percent less than the respective averages in Non-Southwest Markets.

In medium-haul stratifications, the weighted average length of haul in Southwest Markets is 4.51 percent less than the average in Non-Southwest Markets — 889 miles versus 931 miles, and Southwest’s average fare is 38.49 percent less than the average fare in medium-haul Non-Southwest Markets. Some of the difference in medium-haul fares probably is attributable to differences between Southwest Markets and Non-Southwest Markets in their
respective average lengths of haul. However, the differences between Southwest Markets and Non-Southwest Markets in medium-haul fares range from 23.88 percent to 44.08 percent, while the differences in medium-haul lengths of haul are all less than ten percent. For example, in low-density medium-haul markets, the weighted average length of haul in Southwest Markets is 9.91 percent longer than the comparable average in Non-Southwest Markets, but the weighted average fare in Southwest Markets is 23.88 percent below the average fare in comparable Non-Southwest Markets.

In short-haul markets, the Southwest advantage appears to be even greater. In high-density short-haul markets, which represent Southwest’s single largest market stratification, the weighted average length of haul in Southwest Markets and in Non-Southwest Markets is nearly identical, but weighted average fares in Southwest Markets are more than 60 percent below the fares in Non-Southwest Markets. Moreover, in medium-density short-haul markets, where the weighted average length of haul in Southwest Markets is 20.44 percent higher than in comparable Non-Southwest Markets, the average fare in Southwest Markets
is 50.00 percent lower than in Non-Southwest Markets. Overall, short-haul Southwest Markets have 1.26 percent longer weighted average lengths of haul, but 61.51 percent lower weighted average fares than short-haul Non-Southwest Markets.

The weighted average one-way fare in all Southwest Markets is $70.06, which is 44.14 percent of the weighted average one-way fare in Non-Southwest Markets. Although the amount of fare difference varies by market, the results of the stratification analysis are deemed to support hypothesis 2.1, which posits that average fares in Non-Southwest Markets are higher than average fares in markets where Southwest is an effective competitor.

Further support for hypothesis 2.1 is provided in Table 25 which compares the weighted-average one-way fares in Non-Southwest Markets with the weighted average fares in Southwest Markets when Southwest’s fares are excluded. In Table 25, the fare in Southwest Markets is the weighted average fare collected by all carriers in the airport-pair, except Southwest.
Table 25  Fare Comparisons, Excluding Southwest’s Fares

<table>
<thead>
<tr>
<th>1993 Market Stratifications</th>
<th>Southwest Markets, Excluding Southwest</th>
<th>Non-Southwest Markets</th>
<th>Southwest Fares as a Percent of Non-Southwest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Mkts.</td>
<td>Wt. Avg. Fare*</td>
<td># of Mkts.</td>
</tr>
<tr>
<td>Short-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>3</td>
<td>$ 147.25</td>
<td>152</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>21</td>
<td>$ 95.22</td>
<td>112</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>68</td>
<td>$ 67.63</td>
<td>68</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>92</td>
<td>$ 69.60</td>
<td>332</td>
</tr>
<tr>
<td>Medium-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>57</td>
<td>$ 155.52</td>
<td>703</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>65</td>
<td>$ 123.66</td>
<td>300</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>35</td>
<td>$ 105.63</td>
<td>228</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>157</td>
<td>$ 117.90</td>
<td>1,231</td>
</tr>
<tr>
<td>Long-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>37</td>
<td>$ 188.27</td>
<td>239</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>15</td>
<td>$ 177.45</td>
<td>67</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>6</td>
<td>$ 163.69</td>
<td>28</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>58</td>
<td>$ 176.36</td>
<td>334</td>
</tr>
<tr>
<td>TOTALS</td>
<td>307</td>
<td>$ 88.88</td>
<td>1,897</td>
</tr>
</tbody>
</table>

* Wt. Avg. Fare is the weighted average one-way fare based on all passengers in all markets in each stratification.

Excluding Southwest’s fares from the computation of weighted average fares in Southwest Markets results in overall average fares in Southwest Markets which are 56.00 percent of the weighted average fares in Non-Southwest Markets. The fares in Southwest Markets when Southwest’s fares are excluded tend to follow the same general
patterns as when Southwest's fares are included — the ratio of fares in Southwest Markets as a percent of fares in Non-Southwest Markets rises as length of haul rises; within each length of haul stratification, fares in Southwest Markets decrease as traffic density increases; and within each length of haul stratification, the disparity between fares in Southwest Markets and fares in Non-Southwest Markets widen as traffic density increases. The findings lend additional support for hypothesis 2.1.

Results of the test of hypothesis 2.2

Hypothesis 2.2: In Southwest's 1989-1993 New Markets, average fares decreased from the year prior to Southwest's entry to 1993.

Table 26 shows the weighted-average one-way fares in Southwest's New Markets in the year prior to Southwest offering service at both airports and in 1993. Southwest's fares are included in the weighted average fares shown in Table 26.
Table 26  New Market Fares, Including Southwest’s Fares

<table>
<thead>
<tr>
<th>Southwest’s Year of Entry</th>
<th>Number of New Markets</th>
<th>Weighted Avg. Haul</th>
<th>Weighted Average One-Way Fares</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Year Prior To Entry</td>
</tr>
<tr>
<td>1989</td>
<td>31</td>
<td>547</td>
<td>$ 96.10</td>
</tr>
<tr>
<td>1990</td>
<td>19</td>
<td>402</td>
<td>$ 82.87</td>
</tr>
<tr>
<td>1991</td>
<td>15</td>
<td>560</td>
<td>$ 114.26</td>
</tr>
<tr>
<td>1992</td>
<td>20</td>
<td>687</td>
<td>$ 164.91</td>
</tr>
<tr>
<td>1993</td>
<td>22</td>
<td>445</td>
<td>$ 96.52</td>
</tr>
<tr>
<td>AVERAGES</td>
<td>21.4</td>
<td>514</td>
<td>$ 102.75</td>
</tr>
</tbody>
</table>

Conclusion: Hypothesis 2.2 is supported.

Comment of findings: In every year’s set of New Markets, the weighted average fare in 1993 was substantially lower than the weighted average fare in the year prior to Southwest’s entry. For example, in the 31 airport-pairs identified as 1989 New Markets, the weighted average fare was $64.99 in 1993 compared with $96.10 in 1988, the year prior to Southwest’s entry into the market. The declines in fares following Southwest’s entry ranged from a low of 27.95 percent for the 1993 New Markets to a high of 51.01 percent for the 1992 New Markets.
Overall, the weighted average fare in all 107 New Markets was $58.42 in 1993, compared with a weighted average of $102.75 in the years prior to Southwest's entry, which represents a decrease of 43.14 percent. The observed decrease in weighted average fares is deemed to support hypothesis 2.2 which posits that average fares fall in an airport-pair after Southwest enters the market.

Further support of hypothesis 2.2 is shown in Table 27 which compares weighted average fares in Southwest's New Markets when Southwest's fares are excluded from the calculation.

<table>
<thead>
<tr>
<th>Southwest's Year of Entry</th>
<th>Number of New Markets</th>
<th>Weighted Average Fares of All Others</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Year Prior To Entry</td>
<td>1993</td>
</tr>
<tr>
<td>1989</td>
<td>31</td>
<td>$ 96.10</td>
<td>$ 78.71</td>
</tr>
<tr>
<td>1990</td>
<td>19</td>
<td>$ 82.87</td>
<td>$ 77.15</td>
</tr>
<tr>
<td>1991</td>
<td>15</td>
<td>$ 114.26</td>
<td>$ 85.47</td>
</tr>
<tr>
<td>1992</td>
<td>20</td>
<td>$ 164.91</td>
<td>$ 117.64</td>
</tr>
<tr>
<td>1993</td>
<td>22</td>
<td>$ 96.52</td>
<td>$ 95.12</td>
</tr>
<tr>
<td>AVERAGES</td>
<td>21.4</td>
<td>$ 102.75</td>
<td>$ 78.92</td>
</tr>
</tbody>
</table>

When Southwest's fares are excluded from the computation of weighted average fares in New Markets, the average 1993
fare rose 35.09% to $78.32 from the $58.42 average fare in 1993 when Southwest's fares were included. Even with the higher average in 1993 when Southwest's fares are excluded, 1993 fares in New Markets were still 23.19 percent below the weighted average in the years prior to Southwest's entry. The findings provide further support for hypothesis 2.2.

Results of the test of hypothesis 2.3

Hypothesis 2.3: Between 1988 and 1993, the average fare decreased in markets among the top 3,000 airport-pairs where Southwest was not an effective competitor.

Table 28 shows the weighted-average one-way fares in Non-Southwest Markets in 1988 and in 1993.
<table>
<thead>
<tr>
<th>Market Stratifications</th>
<th>1988</th>
<th>1993</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Mkt.</td>
<td>Wt. Avg. Fare</td>
<td># of Mkt.</td>
</tr>
<tr>
<td>Short-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>203</td>
<td>$112.48</td>
<td>152</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>177</td>
<td>$102.57</td>
<td>112</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>104</td>
<td>$88.92</td>
<td>68</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>484</td>
<td>$94.79</td>
<td>332</td>
</tr>
<tr>
<td>Medium-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>827</td>
<td>$146.51</td>
<td>703</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>361</td>
<td>$137.38</td>
<td>300</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>190</td>
<td>$131.12</td>
<td>228</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>1,368</td>
<td>$135.60</td>
<td>1,231</td>
</tr>
<tr>
<td>Long-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>283</td>
<td>$172.17</td>
<td>239</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>85</td>
<td>$161.84</td>
<td>67</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>22</td>
<td>$155.93</td>
<td>28</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>390</td>
<td>$163.81</td>
<td>334</td>
</tr>
<tr>
<td>TOTALS</td>
<td>2,086</td>
<td>$125.52</td>
<td>1,897</td>
</tr>
</tbody>
</table>

* Wt. Avg. Fare is the weighted average one-way fare based on all passengers in all markets in each stratification.

**Conclusion:** Hypothesis 2.3 is not supported.

**Comment on findings:** Between 1988 and 1993, the time period covered by the fare analysis of Southwest’s New Markets, weighted average one-way fares in Non-Southwest Markets increased in all market stratifications. In
short-haul and long-haul markets, weighted average one-way fares in Non-Southwest Markets increased 35.26 percent and 25.61 percent, respectively. In medium-haul Non-Southwest Markets, weighted average one-way fares increased 18.62 percent between 1988 and 1993.

Given the correlation between length of haul and the weighted average one-way fare, it is necessary to compare the weighted average lengths of haul in 1988 and 1993. Table 29 shows the weighted average lengths of haul in Non-Southwest Markets in 1988 and in 1993.
Table 29 Weighted Average Lengths of Haul In Non-Southwest Markets

<table>
<thead>
<tr>
<th>Market Stratifications</th>
<th>1988</th>
<th></th>
<th>1993</th>
<th></th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Mkt.</td>
<td>Weighted Avg. Haul*</td>
<td># of Mkt.</td>
<td>Weighted Avg. Haul*</td>
<td></td>
</tr>
<tr>
<td><strong>Short-haul</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>203</td>
<td>323</td>
<td>152</td>
<td>322</td>
<td>- 0.31%</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>177</td>
<td>306</td>
<td>112</td>
<td>318</td>
<td>3.92%</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>104</td>
<td>310</td>
<td>68</td>
<td>315</td>
<td>1.61%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>484</td>
<td>310</td>
<td>332</td>
<td>316</td>
<td>1.94%</td>
</tr>
<tr>
<td><strong>Medium-haul</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>827</td>
<td>939</td>
<td>703</td>
<td>959</td>
<td>2.13%</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>351</td>
<td>922</td>
<td>300</td>
<td>922</td>
<td>- - -</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>190</td>
<td>920</td>
<td>228</td>
<td>923</td>
<td>0.33%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>1,368</td>
<td>924</td>
<td>1,231</td>
<td>928</td>
<td>0.11%</td>
</tr>
<tr>
<td><strong>Long-haul</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>283</td>
<td>1,825</td>
<td>239</td>
<td>1,855</td>
<td>1.64%</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>85</td>
<td>1,822</td>
<td>67</td>
<td>1,870</td>
<td>2.63%</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>22</td>
<td>1,714</td>
<td>28</td>
<td>1,732</td>
<td>1.05%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>390</td>
<td>1,792</td>
<td>334</td>
<td>1,811</td>
<td>1.06%</td>
</tr>
<tr>
<td>TOTALS</td>
<td>2,086</td>
<td>820</td>
<td>1,897</td>
<td>893</td>
<td>8.90%</td>
</tr>
</tbody>
</table>

* Wt. Avg. Haul is the weighted average length of haul based on all passengers in all markets in each stratification.

In all three length of haul stratifications of Non-Southwest Markets, the observed change in the weighted average length of haul was less than two percent between 1988 and 1993. Within the nine market stratifications, none experienced a change of greater than four percent, and in six of the nine stratifications the change was less
than two percent. Consequently, it appears changes in the weighted average lengths of haul are not major factors accounting for the observed changes in weighted average one-way fares in Non-Southwest Markets.

Overall, the weighted average length of haul in Non-Southwest Markets increased 8.90 percent to 893 miles in 1993 from 820 miles in 1988, while the weighted average fares in all Non-Southwest Markets increased 26.45 percent from $125.52 in 1988 to $158.72 in 1993. Based on the observed increase in fares, which exceeds the observed increase in weighted average length of haul between 1988 and 1993, the findings are deemed to not support hypothesis 2.3 which posits that fares decreased between 1988 and 1993 in Non-Southwest Markets.
General hypothesis three

The third stratification analysis is designed to answer two questions regarding the hypothesized relationship between Southwest’s presence and market response. First, does market response in Southwest Markets differ from market response in airport-pairs in which Southwest is not an effective competitor? Second, does a change in market response occur after Southwest’s entry in an airport-pair? Market response is measured by the average number of Origin and Destination passengers per day each way (O&D pdew) and the average market revenues per day each way (revenues pdew).

General hypothesis three: Southwest’s presence is correlated with market response.
Results of the test of hypothesis 3.1.

**Hypothesis 3.1:** In airport-pairs with comparable traffic densities and lengths of haul, 1993 O&D demand in markets where Southwest was not an effective competitor was lower than O&D demand in markets where Southwest was an effective competitor.

Table 30 shows the average number of O&D pdew in the top airport-pairs in the continental U.S.

### Table 30 O&D pdew in Southwest and Non-Southwest Markets

<table>
<thead>
<tr>
<th>1993 Market Stratifications</th>
<th>Southwest Markets</th>
<th>Non-Southwest Markets</th>
<th>Southwest O&amp;D as a Percent of Non-Southwest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Mks.</td>
<td>Average O&amp;D pdew</td>
<td># of Mks.</td>
</tr>
<tr>
<td><strong>Short-haul</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>3</td>
<td>34.7</td>
<td>152</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>21</td>
<td>98.7</td>
<td>112</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>68</td>
<td>549.8</td>
<td>68</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>92</td>
<td>430.1</td>
<td>332</td>
</tr>
<tr>
<td><strong>Medium-haul</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>57</td>
<td>33.8</td>
<td>703</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>65</td>
<td>83.2</td>
<td>300</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>35</td>
<td>263.9</td>
<td>228</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>157</td>
<td>105.5</td>
<td>1,231</td>
</tr>
<tr>
<td><strong>Long-haul</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>37</td>
<td>31.3</td>
<td>239</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>15</td>
<td>81.6</td>
<td>67</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>6</td>
<td>198.8</td>
<td>28</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>58</td>
<td>61.6</td>
<td>334</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td>307</td>
<td>194.5</td>
<td>1,897</td>
</tr>
</tbody>
</table>
Conclusion: Hypothesis 3.1 is supported.

Comment on findings: In five of the nine market stratifications, which account for 60.59 percent of all Southwest Markets, the number of Origin and Destination passengers per day each way in Southwest Markets is greater than the number of O&D pdeW in comparable Non-Southwest Markets. In short-haul markets, the average number of O&D pdeW in Southwest Markets is 371.10 percent of the average O&D pdeW in Non-Southwest Markets. In medium-haul and long-haul markets, the average number of O&D pdeW in Southwest Markets are 102.53 percent and 106.94 percent, respectively, of the average O&D pdeW in comparable Non-Southwest Markets.

In high-density short-haul markets, which account for 22.15 percent of all Southwest Markets, the average O&D pdeW of 549.8 in Southwest Markets is 156.06 percent of the 352.3 O&D pdeW in the comparable Non-Southwest Markets. In low-density medium-haul and in low-density long-haul markets, O&D pdeW in Southwest Markets are 121.15 percent and 121.32 percent, respectively, of the O&D pdeW in comparable Non-Southwest Markets.
In medium-density medium-haul and in medium-density long-haul markets, the average number of O&D pdew in Southwest Markets is nearly identical to the number of O&D pdew in Non-Southwest Markets. Only in high-density medium-haul and in high-density long-haul markets are the O&D pdew averages in Southwest Markets substantially less than the comparable averages in Non-Southwest Markets. The two market stratifications in which the averages in Southwest Markets are less than in Non-Southwest Markets account for only 12.38 percent of Southwest Markets.

In both Southwest Markets and Non-Southwest Markets, the average number of O&D pdew decreases as length of haul increases. In Southwest Markets, the average number of O&D pdew falls from 430.1 in short-haul markets to 105.5 in medium-haul markets and to 61.6 Origin and Destination passengers per day each way in long-haul markets.

Although the average O&D pdew in Southwest Markets is less than the average O&D pdew in Non-Southwest Markets in four of the nine market stratifications, overall, the average number of O&D pdew in Southwest Markets is 194.5, which is
200.10 percent of the average O&D pdew of 97.2 in Non-Southwest Markets. The findings are deemed to support hypothesis 3.1 which posits that the average number of Origin and Destination passengers per day each way in Southwest Markets is greater than the average O&D pdew in comparable Non-Southwest Markets.

Results of the test of hypothesis 3.2.

_Hypothesis 3.2:_ In Southwest's 1989-1993 New Markets, average annual O&D demand increased from the year prior to Southwest's entry to 1993.

Table 31 shows the total number of Origin and Destination Passengers per day each way in Southwest's New Markets in the year prior to Southwest offering service at both airports and in 1993.
Table 31  Average O&D pdew In Southwest's New Markets

<table>
<thead>
<tr>
<th>Southwest's Year of Entry</th>
<th>Number of New Markets</th>
<th>Average O&amp;D Per Day Each Way</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Year Prior To Entry</td>
</tr>
<tr>
<td>1989</td>
<td>31</td>
<td>74.9</td>
</tr>
<tr>
<td>1990</td>
<td>19</td>
<td>94.4</td>
</tr>
<tr>
<td>1991</td>
<td>15</td>
<td>88.9</td>
</tr>
<tr>
<td>1992</td>
<td>20</td>
<td>41.5</td>
</tr>
<tr>
<td>1993</td>
<td>22</td>
<td>96.0</td>
</tr>
<tr>
<td>AVERAGES</td>
<td>21.4</td>
<td>78.4</td>
</tr>
</tbody>
</table>

Conclusion:  Hypothesis 3.2 is supported.

Comment on findings:  In four of the five annual sets of Southwest's New Markets, the average number of O&D pdew more than doubled from the year prior to Southwest's entry to 1993. The increases in the average number of O&D pdew ranged from 64.58 percent for the 1993 New Markets to 177.35 percent for the 1992 New Markets. Overall, the average number of O&D pdew in all New Markets increased 134.31 percent from 78.4 in the years prior to entry to 183.7 in 1993. The observed results are deemed to support hypothesis 3.2 which posits that average O&D pdew increases in an airport-pair after Southwest enters the market.
Results of the test of hypothesis 3.3.

_Hypothesis 3.3:_ Between 1988 and 1993, the O&D demand increased in markets among the top 3,000 airport-pairs where Southwest was not an effective competitor.

Table 32 shows the average number of Origin and Destination Passengers per day each way in Non-Southwest Markets in 1988 and in 1993.

**Table 32  Average O&D pdew In Non-Southwest Markets**

<table>
<thead>
<tr>
<th>Market Stratifications</th>
<th>1988</th>
<th>1993</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Mkt.</td>
<td>Average O&amp;D pdew</td>
<td># of Mkt.</td>
</tr>
<tr>
<td>Short-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>203</td>
<td>31.7</td>
<td>152</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>177</td>
<td>88.1</td>
<td>112</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>104</td>
<td>385.2</td>
<td>68</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>484</td>
<td>128.3</td>
<td>332</td>
</tr>
<tr>
<td>Medium-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>827</td>
<td>26.9</td>
<td>703</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>351</td>
<td>86.9</td>
<td>300</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>190</td>
<td>349.9</td>
<td>228</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>1,368</td>
<td>87.0</td>
<td>1,231</td>
</tr>
<tr>
<td>Long-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>283</td>
<td>24.8</td>
<td>239</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>85</td>
<td>86.0</td>
<td>67</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>22</td>
<td>245.3</td>
<td>28</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>390</td>
<td>51.1</td>
<td>334</td>
</tr>
<tr>
<td>TOTALS</td>
<td>2,086</td>
<td>91.1</td>
<td>1,897</td>
</tr>
</tbody>
</table>
Conclusion: Hypothesis 3.3 is supported.

Comment on findings: In five of the nine market stratifications, which accounted for 71.16 percent of Non-Southwest Markets in 1993, the average number of O&D pdew in 1993 was greater than the average O&D pdew in the respective stratifications in 1988. The average number of O&D pdew increased 16.67 percent in medium-haul markets and 12.72 percent in long-haul markets between 1988 and 1993. Within each length of haul stratification of traffic density, the increases were smaller and ranged from 1.94 percent in high-density medium-haul markets to 10.19 percent in high-density long-haul markets.

In four of the nine market stratifications of Non-Southwest Markets, the average number of O&D pdew decreased between 1998 and 1993, and the decreases ranged from 1.61 percent in medium-density medium-haul markets to 8.54 percent in high-density short-haul markets. The average number of O&D pdew decreased 9.66 percent in short-haul markets between 1988 and 1993.
Although the stratified averages provide contradictory results, overall, the average number of O&D pdew in Non-Southwest Markets increased from 91.1 in 1988 to 97.2 in 1993, a rise of 6.70 percent, and the observed results are deemed to support hypothesis 3.3 which posits that the average number of Origin and Destination passengers per day each way in Non-Southwest Markets increased between 1988 and 1993.

Results of the test of hypothesis 3.4.

_Hypothesis 3.4:_ In airport-pairs with comparable traffic densities and lengths of haul, 1993 market revenues in markets where Southwest was not an effective competitor were lower than market revenues in markets where Southwest was an effective competitor.

Table 33 shows the average market revenues per day each way in the top airport-pairs in the continental U.S.
Table 33 Revenues per day in Southwest and Non-Southwest Markets

<table>
<thead>
<tr>
<th>1993 Market Stratifications</th>
<th>Southwest Markets</th>
<th>Non-Southwest Markets</th>
<th>Southwest Revenues as a Percent of Non-Southwest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Mks.</td>
<td>Revenues per day</td>
<td># of Mks.</td>
</tr>
<tr>
<td>Short-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 Q&amp;D</td>
<td>3</td>
<td>$ 3,286</td>
<td>152</td>
</tr>
<tr>
<td>51-150 Q&amp;D</td>
<td>21</td>
<td>$ 6,565</td>
<td>112</td>
</tr>
<tr>
<td>Over 150 Q&amp;D</td>
<td>68</td>
<td>$ 26,540</td>
<td>68</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>92</td>
<td>$ 21,223</td>
<td>332</td>
</tr>
<tr>
<td>Medium-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 Q&amp;D</td>
<td>57</td>
<td>$ 4,418</td>
<td>703</td>
</tr>
<tr>
<td>51-150 Q&amp;D</td>
<td>65</td>
<td>$ 8,757</td>
<td>300</td>
</tr>
<tr>
<td>Over 150 Q&amp;D</td>
<td>35</td>
<td>$ 23,381</td>
<td>228</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>157</td>
<td>$ 10,442</td>
<td>1,231</td>
</tr>
<tr>
<td>Long-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 Q&amp;D</td>
<td>37</td>
<td>$ 5,417</td>
<td>239</td>
</tr>
<tr>
<td>51-150 Q&amp;D</td>
<td>15</td>
<td>$ 13,502</td>
<td>67</td>
</tr>
<tr>
<td>Over 150 Q&amp;D</td>
<td>6</td>
<td>$ 31,415</td>
<td>28</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>58</td>
<td>$ 10,197</td>
<td>334</td>
</tr>
<tr>
<td>TOTALS</td>
<td>307</td>
<td>$ 13,626</td>
<td>1,897</td>
</tr>
</tbody>
</table>

Conclusion: Hypothesis 3.4 is not supported.

Comment on findings: In both Southwest Markets and Non-Southwest Markets, average market revenues per day each way increase as traffic density increases. In Non-Southwest Markets, average revenues in high-density short-haul markets are nearly nine times greater than average revenues in low-density short-haul markets. In short-haul
Southwest Markets, the ratio of high-density to low-density revenues is greater than eight-to-one.

In Southwest Markets, average market revenues decrease as length of haul increases, and average revenues in Southwest's short-haul markets average more than twice as much as average revenues in either medium-haul or long-haul Southwest Markets. In Non-Southwest Markets, average revenues are highest in the medium-haul stratification.

In six of the nine market stratifications, which account for 64.50 percent of Southwest Markets, average revenues per day each way in Southwest Markets are at least 30 percent below average revenues in comparable Non-Southwest Markets. In two other market stratifications — low-density medium-haul and medium-density long-haul which account for 23.45 percent of Southwest Markets — average revenues in Southwest Markets are 7.82 percent and 17.80 percent lower, respectively, than in the comparable Non-Southwest Markets.
Revenues per day each way in Southwest's long-haul markets average 86.07 percent of the revenues in long-haul Non-Southwest Markets. In medium-haul markets, average revenues per day in Southwest Markets are 63.11 percent of the average revenues in comparable Non-Southwest Markets. However, average revenues for all short-haul markets are 42.85 percent greater in Southwest Markets than in Non-Southwest Markets, but the average is misleading. Average revenues in all short-haul Southwest Markets are $21,223 per day each way, compared with average short-haul revenues of $14,857 in Non-Southwest Markets, but within each short-haul stratification of traffic density, the average revenues in Southwest Markets are substantially below the averages in comparable Non-Southwest Markets.

The short-haul averages are misleading because a higher proportion of lower revenue low-density and medium-density Non-Southwest Markets are included in the computation of the average short-haul revenues. For example, there is an identical number of high-density markets (68) used in the computation of the short-haul averages in both Southwest Markets and Non-Southwest Markets. However, Southwest's 68 high-density short-haul markets, which have average
revenues pdew of $26,540, account for 73.91 percent of Southwest’s short-haul markets. By comparison, the 68 high-density short-haul Non-Southwest Markets, which account for just 20.48 percent of total short-haul markets in Non-Southwest Markets, have average revenues of $42,892. Similarly, only 3.26 percent of Southwest’s short-haul markets are in the low-density stratification — the lowest revenue stratification — compared with 45.78 percent of the low revenue low-density markets used to compute the average short-haul revenues in Non-Southwest Markets. Consequently, average revenues in short-haul markets are higher in Southwest Markets due to (i) a higher proportion of high-density markets, and (ii) a lower proportion of low-density markets included in the computation of the short-haul average.

Overall, average revenues per day each way in all Southwest Markets of $13,626 are 11.66 percent less than the average revenues pdew of $15,424 in Non-Southwest Markets. Consequently, the observed findings are deemed not to support hypothesis 3.4 which posits that average revenues pdew in Non-Southwest Markets are lower than average revenues pdew in Southwest Markets.
Results of the test of hypothesis 3.5.

**Hypothesis 3.5:** In Southwest’s 1989-1993 New Markets, average annual market revenues rose from the year prior to Southwest’s entry to 1993.

Table 34 shows the average market revenues per day each way in Southwest’s New Markets in the year prior to Southwest offering service at both airports and in 1993.

<table>
<thead>
<tr>
<th>Southwest’s Year of Entry</th>
<th>Number of New Markets</th>
<th>Market Revenues per day each way</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Year Prior To Entry</td>
</tr>
<tr>
<td>1989</td>
<td>31</td>
<td>$ 7,109</td>
</tr>
<tr>
<td>1990</td>
<td>19</td>
<td>$ 7,824</td>
</tr>
<tr>
<td>1991</td>
<td>15</td>
<td>$ 10,161</td>
</tr>
<tr>
<td>1992</td>
<td>20</td>
<td>$ 6,850</td>
</tr>
<tr>
<td>1993</td>
<td>22</td>
<td>$ 9,262</td>
</tr>
<tr>
<td>AVERAGES</td>
<td>21.4</td>
<td>$ 8,058</td>
</tr>
</tbody>
</table>

**Conclusion:** Hypothesis 3.5 is supported.

**Comment on findings:** In each year’s set of New Markets, average revenues per day increased at least 25 percent from the year prior to Southwest’s entry to 1993. The increases in revenues ranged from 25.88 percent in the
1993 New Markets to 79.59 percent in the 1988 New Markets. Overall, average revenues in New Markets increased 46.67 percent from an average of $8,058 in the years prior to entry to $11,819 in 1993. The observed results are deemed to support hypothesis 3.5 which posits that average market revenues pdew increase after Southwest enters an airport-pair.

Results of the test of hypothesis 3.6.

Hypothesis 3.6: Between 1988 and 1993, market revenues decreased in markets among the top 3,000 airport-pairs where Southwest was not an effective competitor.

Table 35 shows the average market revenues per day each way in Non-Southwest Markets in 1988 and in 1993.
### Table 35  Average Revenues per Day in Non-Southwest Markets

<table>
<thead>
<tr>
<th>Market Stratifications</th>
<th>1988</th>
<th></th>
<th>1993</th>
<th></th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Mkt.</td>
<td>Revenues per day</td>
<td># of Mkt.</td>
<td>Revenues per day</td>
<td></td>
</tr>
<tr>
<td><strong>Short-haul</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 Q&amp;D</td>
<td>203</td>
<td>$3,571</td>
<td>152</td>
<td>$4,882</td>
<td>36.71%</td>
</tr>
<tr>
<td>51-150 Q&amp;D</td>
<td>177</td>
<td>$9,034</td>
<td>112</td>
<td>$11,373</td>
<td>25.89%</td>
</tr>
<tr>
<td>Over 150 Q&amp;D</td>
<td>104</td>
<td>$34,254</td>
<td>68</td>
<td>$42,892</td>
<td>25.22%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>484</td>
<td>$12,162</td>
<td>332</td>
<td>$14,857</td>
<td>22.16%</td>
</tr>
<tr>
<td><strong>Medium-haul</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 Q&amp;D</td>
<td>827</td>
<td>$3,941</td>
<td>703</td>
<td>$4,793</td>
<td>21.62%</td>
</tr>
<tr>
<td>51-150 Q&amp;D</td>
<td>351</td>
<td>$11,931</td>
<td>300</td>
<td>$13,705</td>
<td>14.87%</td>
</tr>
<tr>
<td>Over 150 Q&amp;D</td>
<td>190</td>
<td>$45,740</td>
<td>223</td>
<td>$56,529</td>
<td>23.59%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>1,368</td>
<td>$11,796</td>
<td>1,231</td>
<td>$16,547</td>
<td>40.28%</td>
</tr>
<tr>
<td><strong>Long-haul</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 Q&amp;D</td>
<td>283</td>
<td>$4,261</td>
<td>239</td>
<td>$5,303</td>
<td>24.45%</td>
</tr>
<tr>
<td>51-150 Q&amp;D</td>
<td>85</td>
<td>$13,924</td>
<td>67</td>
<td>$16,425</td>
<td>17.96%</td>
</tr>
<tr>
<td>Over 150 Q&amp;D</td>
<td>22</td>
<td>$39,657</td>
<td>28</td>
<td>$56,753</td>
<td>43.11%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>390</td>
<td>$8,364</td>
<td>334</td>
<td>$11,847</td>
<td>41.64%</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td>2,086</td>
<td>$11,430</td>
<td>1,897</td>
<td>$15,424</td>
<td>34.94%</td>
</tr>
</tbody>
</table>

**Conclusion:** Hypothesis 3.6 is not supported.

**Comment on findings:** In all nine market stratifications and in total, average market revenues per day each way increased between 1988 and 1993 in Non-Southwest Markets. The increases ranged from 14.97 percent in medium-density medium-haul markets to 43.11 percent in high-density long-haul markets. In seven of
the nine stratifications, which accounted for 80.65 percent of the Non-Southwest Markets in 1993, the percentage increases were greater than 21.00 percent.

Overall, average revenues per day each way in Non-Southwest Markets increased 34.94 percent from $11,430 in 1988 to $15,424 in 1993. The observed findings are deemed to not support hypothesis 3.6 which posits that average revenues in Non-Southwest Markets decreased between 1988 and 1993.

**General hypothesis four**

The stratification analysis seeks to answer two questions regarding conduct in Adjacent Markets. First, do carriers in Adjacent Markets exhibit conduct that is different from either Southwest Markets or Non-Southwest Markets? Second, does a change occur in the conduct of carriers in Adjacent Markets after Southwest's entry in an adjacent airport-pair? Market conduct in Adjacent Markets is measured by the weighted average fare.
General hypothesis four: The conduct of carriers in
Adjacent Markets is correlated with Southwest's
presence in airport-pair markets.

Adjacent Markets are airport-pairs not served by
Southwest, but located close enough to an airport served
by Southwest that travelers have relatively easy access to
both the Southwest Airports and non-Southwest airports.
An Adjacent Market formally is defined as an airport-pair
meeting all of the following conditions: (i) the market
was ranked among the top 3,000 airport-pairs in the
continental U.S. in 1993; (ii) one airport was served by
Southwest at yearend 1993; (iii) the other airport was
ranked among the top 100 Origin and Destination airports
in the continental U.S. in 1993; and (iv) the airport not
served by Southwest is located within 150 air-miles of a
Southwest Airport.

Excluded from the definition of Adjacent Markets are
airport-pairs involving Dallas/Ft. Worth International
Airport (DFW) if the Corresponding Southwest Market cannot
be served directly by Southwest from Dallas' Love Field

(DAL) under the restrictions of the Wright Amendment. There are 21 DFW markets which are not included as Adjacent Markets because the second airport in the pair cannot be served directly by Southwest from DAL. For example, Southwest cannot serve Kansas City or Oakland directly from Love Field, so the adjacent airport-pairs of Dallas/Fort Worth-Kansas City and Dallas/Fort Worth-Oakland are not defined as Adjacent Markets.

Also excluded from the definition of Adjacent Markets are airport-pairs in which the Adjacent Airport is paired with its corresponding Southwest Airport. There are three airport-pairs — Atlanta-Birmingham, Columbus-Pittsburgh and Phoenix-Tucson — which are not included as Adjacent Markets because the Adjacent Airport (e.g., Tucson) is paired with its corresponding Southwest Airport (e.g., Phoenix).

Corresponding Southwest Markets are defined as those airport-pairs in which (i) Southwest served both airports at yearend 1993 and (ii) there is a corresponding Adjacent Market. There are 377 Adjacent Markets and a like number
of Corresponding Southwest Markets. There are more Corresponding Southwest Markets (377) than Southwest Markets (307) because the 10.00 percent market share requirement is not used for defining Corresponding Southwest Markets.

In the analyses of Adjacent Markets, the definition of Non-Southwest Markets is modified slightly to encompass markets with lengths of haul less than the longest-haul Adjacent Market. In 1993, the longest-haul Adjacent Market was Oakland-Philadelphia, a distance of 2,598 miles. Therefore, a Non-Southwest Market hereafter is defined as an airport-pair meeting all of the following conditions: (i) ranked in the top 3,000 markets in the continental U.S. based on market revenues; (ii) neither airport in the pair was served by Southwest at yearend 1993; and (iii) the weighted average length of haul is less than the longest-haul Adjacent Market.

Table 36 presents a stratification of the top revenue markets by Adjacent Markets, the Corresponding Southwest Markets and by Non-Southwest Markets with lengths of haul less than the longest-haul Adjacent Market.
Table 36  Adjacent, Corresponding Southwest and Non-Southwest Markets

<table>
<thead>
<tr>
<th>1993 Market Stratifications</th>
<th>Adjacent Markets</th>
<th>Corresponding Southwest Markets</th>
<th>Non-Southwest Markets, Revised</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Short-haul</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>26</td>
<td>352</td>
<td>26</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>28</td>
<td>345</td>
<td>28</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>31</td>
<td>326</td>
<td>31</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>85</td>
<td>331</td>
<td>85</td>
</tr>
<tr>
<td><strong>Medium-haul</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>80</td>
<td>1,031</td>
<td>80</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>44</td>
<td>921</td>
<td>44</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>21</td>
<td>877</td>
<td>21</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>145</td>
<td>918</td>
<td>145</td>
</tr>
<tr>
<td><strong>Long-haul</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>82</td>
<td>2,064</td>
<td>82</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>36</td>
<td>1,949</td>
<td>36</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>29</td>
<td>2,061</td>
<td>29</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>147</td>
<td>2,039</td>
<td>147</td>
</tr>
<tr>
<td>TOTALS</td>
<td>377</td>
<td>1,155</td>
<td>377</td>
</tr>
</tbody>
</table>

The definition of Non-Southwest Markets has been revised to include airport-pairs with lengths of haul longer than the longest-haul Southwest Market but less than the longest-haul Adjacent Market.

*Wt. Avg. Haul is the weighted average length of haul based on all passengers in all markets in each stratification.
Results of the test of hypothesis 4.1.

Hypothesis 4.1: In 1993, average fares in Corresponding Southwest Markets were lower than the average fares in their respective Adjacent Markets.

Table 37 shows weighted-average one-way fares in Adjacent Markets and their Corresponding Southwest Markets.

Table 37  Fares in Corresponding Southwest and Adjacent Markets

<table>
<thead>
<tr>
<th>1993 Market Stratifications</th>
<th>Corresponding Southwest Mkts.</th>
<th>Adjacent Markets</th>
<th>Southwest Fares as a Percent of Adjacent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Mkts.</td>
<td>Wt. Avg. Fare*</td>
<td># of Mkts.</td>
</tr>
<tr>
<td>Short-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>26</td>
<td>$ 70.10</td>
<td>26</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>28</td>
<td>$ 59.70</td>
<td>28</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>31</td>
<td>$ 53.15</td>
<td>31</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>85</td>
<td>$ 57.55</td>
<td>85</td>
</tr>
<tr>
<td>Medium-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>80</td>
<td>$ 113.92</td>
<td>80</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>44</td>
<td>$ 118.75</td>
<td>44</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>21</td>
<td>$ 117.28</td>
<td>21</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>145</td>
<td>$ 115.92</td>
<td>145</td>
</tr>
<tr>
<td>Long-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>82</td>
<td>$ 182.49</td>
<td>82</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>36</td>
<td>$ 172.14</td>
<td>36</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>29</td>
<td>$ 189.00</td>
<td>29</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>147</td>
<td>$ 181.21</td>
<td>147</td>
</tr>
<tr>
<td>TOTALS</td>
<td>377</td>
<td>$ 99.75</td>
<td>377</td>
</tr>
</tbody>
</table>

* Wt. Avg. Fare is the weighted average one-way fare based on all passengers in all markets in each stratification.
Conclusion: Hypothesis 4.1 is supported.

Comment on findings: Weighted average fares in Adjacent Markets tend to follow some of the same general patterns observed in Southwest Markets and Non-Southwest Markets. For example, fares in Adjacent Markets increase with length of haul and decrease as traffic density increases in short-haul and medium-haul markets. However, unlike fares in long-haul Southwest Markets which decline as traffic density increases, fares in long-haul Adjacent Markets follow the same pattern observed in Non-Southwest Markets — fares in low-density long-haul markets are greater than fares in medium-density long-haul markets and less than fares in high-density long-haul markets.

In six of the nine market stratifications, weighted average fares in Adjacent Markets are substantially higher than fares in their Corresponding Southwest Markets. In the three long-haul market stratifications of traffic density, fares in Corresponding Southwest Markets are less than the weighted average fares in the respective Adjacent Markets, but the disparity is not as great as in the other
market stratifications. Weighted average fares in Corresponding Southwest Markets range from 86.37 percent of fares in Adjacent Markets in medium-density long-haul markets to 41.74 percent of fares in Adjacent Markets in low-density short-haul markets.

In short-haul markets, fares in Corresponding Southwest Markets average 54.74 percent of the respective weighted average fares in Adjacent Markets. In medium-haul markets, weighted average fares in Corresponding Southwest Markets average 66.27 percent of the fares in Adjacent Markets. In long-haul markets, weighted average fares in Corresponding Southwest Markets are 82.95 percent of the fares in comparable Adjacent Markets.

Within the short-haul and medium-haul market stratifications, the ratio of weighted average fares in Corresponding Southwest Markets to fares in Adjacent Markets rises as the traffic density increases. In low-density short-haul markets, fares in the Corresponding Southwest Markets are 41.74 percent of the fares in the respective Adjacent Markets, 43.09 percent of medium-density short-haul fares and 57.62 percent of high-density
short-haul fares. In long-haul markets, fares in Corresponding Southwest Markets are 84 percent to 86 percent of fares in Adjacent Markets in all three stratifications of traffic density.

Part of the disparity between fares in Adjacent Markets and their Corresponding Southwest Markets probably is due to differences in lengths of haul. The weighted average length of haul in Adjacent Markets is 1,155 miles, which is 40.51 percent greater than the weighted average length of haul of 822 miles in the Corresponding Southwest Markets. However, the disparities between weighted average lengths of haul are considerably less than the disparities between the weighted average one-way fares.

In short-haul markets, the weighted average fare in Adjacent Markets is 82.71 percent greater than the weighted average fare in comparable Corresponding Southwest Markets ($105.14 versus $57.55), but the weighted average length of haul is only 6.77 percent greater (331 miles versus 310 miles). In medium-haul markets, the weighted average one-way fare in Adjacent Markets is 50.90 percent greater ($174.92 versus $115.92),
but the weighted average length of haul is only 7.75 percent greater (918 miles versus 852 miles). In long-haul markets, the weighted average one-way fare in Adjacent Markets is 20.55 percent greater than fares in Corresponding Southwest Markets ($218.46 versus $181.21), but the weighted average length of haul is only 3.76 percent greater. Therefore, it appears not all of the disparity between weighted average one-way fares in Adjacent Markets and in Corresponding Southwest Markets is due to differences in their weighted average lengths of haul.

Overall, the weighted average fare in Corresponding Southwest Markets is $99.75, which is just 59.10 percent of the weighted average fare of $168.79 in the respective Adjacent Markets. The observed data are deemed to support hypothesis 4.1 which posits that average fares in Corresponding Southwest Markets are lower than average fares in comparable Adjacent Markets.
Results of the test of hypothesis 4.2.

*Hypothesis 4.2:* In 1993, average fares in Adjacent Markets were lower than the average fares in comparable Non-Southwest Markets.

Table 38 shows weighted-average one-way fares in Non-Southwest Markets and in Adjacent Markets.
Table 38  Fares in Non-Southwest and Adjacent Markets

<p>| 1993 Market | Non-Southwest | Adjacent Markets | Non-Southwest Fares as a Percent of Adjacent |
| Stratifications | Markets, Revised | | |</p>
<table>
<thead>
<tr>
<th># Of Mkt.</th>
<th>Wt. Avg. Fare</th>
<th># Of Mkt.</th>
<th>Wt. Avg. Fare</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Short-haul</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>152</td>
<td>$150.23</td>
<td>26</td>
<td>$167.96</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>112</td>
<td>$133.01</td>
<td>28</td>
<td>$138.54</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>68</td>
<td>$121.75</td>
<td>31</td>
<td>$92.25</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>332</td>
<td>$128.21</td>
<td>85</td>
<td>$105.14</td>
</tr>
<tr>
<td><strong>Medium-haul</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>703</td>
<td>$171.50</td>
<td>80</td>
<td>$189.86</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>300</td>
<td>$160.23</td>
<td>44</td>
<td>$179.91</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>228</td>
<td>$158.46</td>
<td>21</td>
<td>$166.73</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>1,231</td>
<td>$160.85</td>
<td>145</td>
<td>$174.92</td>
</tr>
<tr>
<td><strong>Long-haul</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>377</td>
<td>$214.02</td>
<td>82</td>
<td>$215.80</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>108</td>
<td>$208.26</td>
<td>36</td>
<td>$199.31</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>48</td>
<td>$218.09</td>
<td>29</td>
<td>$224.96</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>533</td>
<td>$214.32</td>
<td>147</td>
<td>$213.46</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td>2,096</td>
<td>$163.53</td>
<td>377</td>
<td>$166.79</td>
</tr>
</tbody>
</table>

The definition of Non-Southwest Markets has been revised to include airport-pairs with lengths of haul longer than the longest-haul Southwest Market but less than the longest-haul Adjacent Market.

* Wt. Avg. Fare is the weighted average one-way fare based on all passengers in all markets in each stratification.

**Conclusion:** Hypothesis 4.2 is not supported.

**Comment on findings:** In seven of the nine market stratifications, weighted average fares in Non-Southwest
Markets are less than the weighted average fares in comparable Adjacent Markets. In the seven stratifications, which account for 82.23 percent of the Adjacent Markets, fares in Non-Southwest Markets range from 89.06 percent to 99.18 percent of fares in comparable Adjacent Markets. In only two market stratifications — high-density short-haul and medium-density long-haul — are weighted average one-way fares in Non-Southwest Markets greater than the average fares in comparable stratifications of Adjacent Markets.

The disparity in fares between Adjacent Markets and Non-Southwest Markets decreases as length of haul increases. Average fares in all short-haul markets are 21.94 percent greater in Non-Southwest Markets. In medium-haul markets, the average fares in Non-Southwest Markets are 8.04 percent less than fares in Adjacent Markets. Average fares in long-haul markets differ by less than five percent in total and within each stratification of traffic density. Except for short-haul markets, fares in Adjacent Markets and Non-Southwest Markets generally differ by less than ten percent.
In low-density short-haul and medium-density short-haul markets, average fares in Non-Southwest Markets are 10.56 percent and 3.99 percent less, respectively, than average fares in comparable Adjacent Markets. However, in high-density short-haul markets, average fares in Non-Southwest Markets are 31.98 percent greater than fares in the comparable Adjacent Markets. The weighted average short-haul fare of $128.21 in Non-Southwest Markets is 21.94 percent greater than the weighted average short-haul fare of $105.14 in Adjacent Markets. The difference in the total short-haul fares reflects a higher proportion of higher-priced low-density markets in the computation of the weighted average in Non-Southwest Markets.

Overall, the weighted average one-way fare in Non-Southwest Markets of $163.53 is 3.12 percent less than the weighted average fare of $168.79 in all Adjacent Markets. The results of the stratification analysis, which show generally small, and occasionally contradictory, differences in fares between Non-Southwest Markets and Adjacent Markets, are consistent with the regression analysis of fares in which the coefficient of the Adjacent
Market dummy variable was not significant. The observed results are deemed to not support hypothesis 4.2 which posits that average fares in Adjacent Markets are lower than average fares in comparable Non-Southwest Markets.

_Results of the test of hypothesis 4.3._

_Hypothesis 4.3:_ In airport-pairs adjacent to Southwest’s 1989-1993 New Markets, 1993 average fares were lower than the average fares in the year prior to Southwest becoming an effective competitor.

Table 39 shows the weighted-average one-way fare in airport-pairs adjacent to Southwest’s New Markets in the year prior to Southwest offering service at both airports and in 1993.
Table 39  Weighted Average One-Way Fares In New Adjacent Markets

<table>
<thead>
<tr>
<th>Southwest’s Year of Entry</th>
<th>Number of New Adjacent Markets</th>
<th>Weighted Average One-Way Fares</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Year Prior To Entry</td>
</tr>
<tr>
<td>1989</td>
<td>4</td>
<td>$155.08</td>
</tr>
<tr>
<td>1990</td>
<td>9</td>
<td>$111.08</td>
</tr>
<tr>
<td>1991</td>
<td>5</td>
<td>$131.76</td>
</tr>
<tr>
<td>1992</td>
<td>24</td>
<td>$136.79</td>
</tr>
<tr>
<td>1993</td>
<td>22</td>
<td>$135.96</td>
</tr>
<tr>
<td>AVERAGES</td>
<td>12.8</td>
<td>$132.35</td>
</tr>
</tbody>
</table>

Conclusion:  Hypothesis 4.3 is not supported.

Comment on findings:  Unlike the analyses of hypotheses 4.1 and 4.2, which examined fares in Corresponding Southwest Markets regardless of Southwest’s share of market revenues, hypothesis 4.3 focuses on changes in Adjacent Markets after Southwest becomes an effective competitor in the adjacent Southwest Market. Moreover, unlike previous analyses in which the year of entry was defined as the year Southwest first served both airports, hypothesis 4.3 defines year of entry as the year Southwest first becomes an effective competitor (i.e., achieves at least a 10.00 percent share of market revenues) in the Corresponding Southwest Market.
The imposition of a market share requirement and the modification of the definition of the year of entry are required by the intent of hypothesis 4.3, which seeks to undertake an analysis of airport-pairs adjacent to Southwest's New Markets. New Markets are defined as airport-pairs which meet both of the following conditions: (i) Southwest became an effective competitor in the markets between 1989 and 1993; and (ii) the airport-pairs were still Southwest Markets at yearend 1993. New Markets do not include airport-pairs Southwest entered between 1989 and 1993 if Southwest's share of total market revenues later fell to less than 10.00 percent any time during the 1989 to 1993 time period.

Prior to discussing the results, it also should be noted that there can be more than one new Adjacent Market corresponding to each Southwest New Market. For example, Baltimore-Cleveland became a Southwest New Market in 1993 (i.e., Southwest achieved at least a 10.00 percent share of market revenues in the BWI-CLE airport-pair in 1993), which resulted in the classification of five new Adjacent Markets — Baltimore-Pittsburgh, Cleveland-Washington
National, Cleveland-Washington Dulles, Cleveland-Philadelphia, and Cleveland-Richmond. Of course, not all Southwest New Markets resulted in the classification of a new Adjacent Market. There are 107 Southwest New Markets, but only 64 new Adjacent Markets.

In the 35 airport-pairs adjacent to Southwest's 1989, 1990 and 1993 New Markets, average fares in the Adjacent Markets increased 12.21 percent, 6.31 percent and 0.15 percent, respectively, between the years prior to Southwest's presence as an effective competitor in the New Markets and 1993. In the 29 airport-pairs adjacent to Southwest's 1991 and 1992 New Markets, weighted average fares in the Adjacent Markets decreased 28.20 percent and 0.34 percent, respectively, from the years prior to entry and 1993. Overall, the weighted average one-way fare in all new Adjacent Markets remained essentially unchanged between the years prior to Southwest's entry as an effective competitor in the New Markets and 1993 — $132.35 versus $131.98.

Although fares in the 1991 new Adjacent Markets conform with the hypothesis, weighted average fares in the vast
majority of new Adjacent Markets exhibited very little change between 1988 and 1993. Therefore, the observed results are deemed to not support hypothesis 4.3 which posits that average fares in an Adjacent Market fall after Southwest becomes an effective competitor in the corresponding New Market.

Results of the test of hypothesis 4.4.

Hypothesis 4.4: Between 1988 and 1993, the average fare decreased in markets among the top 3,000 airport-pairs that were neither Southwest Markets nor Adjacent Markets.

Table 40 shows the weighted-average one-way fares in Non-Southwest Markets in 1988 and in 1993. Excluded from Non-Southwest Markets are airport-pairs with lengths of haul greater than the longest haul Adjacent Market — 2,598 miles in 1993 and 2,209 miles in 1988.
Table 40  Fares In Non-Southwest Markets, Revised

<table>
<thead>
<tr>
<th>Market Stratifications</th>
<th>1988</th>
<th>1993</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Mkts.</td>
<td>Wt. Avg. Fare</td>
<td># of Mkts.</td>
</tr>
<tr>
<td>Short-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>203</td>
<td>$112.48</td>
<td>152</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>177</td>
<td>$102.57</td>
<td>112</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>104</td>
<td>$88.92</td>
<td>68</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>484</td>
<td>$94.79</td>
<td>332</td>
</tr>
<tr>
<td>Medium-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>827</td>
<td>$146.51</td>
<td>703</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>351</td>
<td>$137.38</td>
<td>300</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>190</td>
<td>$131.12</td>
<td>228</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>1,368</td>
<td>$135.60</td>
<td>1,231</td>
</tr>
<tr>
<td>Long-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>297</td>
<td>$172.41</td>
<td>377</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>95</td>
<td>$162.22</td>
<td>108</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>25</td>
<td>$155.98</td>
<td>48</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>417</td>
<td>$163.83</td>
<td>533</td>
</tr>
<tr>
<td>TOTALS</td>
<td>2,269</td>
<td>$126.16</td>
<td>2,096</td>
</tr>
</tbody>
</table>

The definition of Non-Southwest Markets has been revised to include airport-pairs with lengths of haul longer than the longest-haul Southwest Market but less than the longest-haul Adjacent Market.

* Wt. Avg. Fare is the weighted average one-way fare based on all passengers in all markets in each stratification.

**Conclusion:** Hypothesis 4.4 is not supported.

**Comment on findings:** The stratification analysis of hypothesis 4.4 utilizes much of the same data as the
stratification analysis of hypothesis 2.3, which also compares fares in Non-Southwest Markets in 1988 and 1993. The only difference between the two analyses is the inclusion in the analysis of hypothesis 4.4 of airport-pairs whose lengths of haul are more than Southwest's longest-haul markets but less than the longest-haul Adjacent Markets in 1988 and 1993.

In 1988, 27 long-haul Non-Southwest Markets had lengths of haul between 2,166 miles (the longest-haul Southwest Market) and 2,209 miles (the longest-haul Adjacent Market), and the 27 markets were included in the long-haul stratifications of traffic density used to test hypothesis 4.4. Similarly, in 1993, there were 199 long-haul Non-Southwest Markets with weighted average lengths of haul between 2,239 miles (the longest-haul Southwest Market) and 2,598 miles (the longest-haul Adjacent Market), and the 199 markets were included in the long-haul stratifications of traffic density.

A detailed discussion of changes in fares in short-haul and medium-haul Non-Southwest Markets can be found in the comment on findings of the stratification analysis of
hypothesis 2.3. In summary, between 1988 and 1993 average short-haul fares in Non-Southwest Markets increased 35.25 percent, and average medium-haul fares in Non-Southwest Markets increased by 16.62 percent.

Adding long-haul markets to include those up to the longest-haul Adjacent Market does not change the conclusions reached in the prior analysis of fares in Non-Southwest Markets. Average fares in all long-haul stratifications of traffic density increased at least 24 percent between 1988 and 1993, and average long-haul fares increased 30.82 percent. Overall, the weighted average fare in Non-Southwest Markets increased 29.62 percent from $126.16 in 1988 to $163.53 in 1993.

Given the importance of length of haul in determining fares, it is worth analyzing lengths of haul in 1988 and in 1993. Table 41 shows the weighted average lengths of haul in Non-Southwest Markets by market stratification in 1988 and 1993.
### Table 41  Average Lengths of Haul In Non-Southwest Markets, Revised

<table>
<thead>
<tr>
<th>Market Stratifications</th>
<th>1988</th>
<th>1993</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Mkts.</td>
<td>Wt. Avg. Haul*</td>
<td># of Mkts.</td>
</tr>
<tr>
<td><strong>Short-haul</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>203</td>
<td>323</td>
<td>152</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>177</td>
<td>306</td>
<td>112</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>104</td>
<td>310</td>
<td>68</td>
</tr>
<tr>
<td><strong>Sub-totals</strong></td>
<td>484</td>
<td>310</td>
<td>332</td>
</tr>
<tr>
<td><strong>Medium-haul</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>827</td>
<td>935</td>
<td>703</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>351</td>
<td>922</td>
<td>300</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>190</td>
<td>920</td>
<td>228</td>
</tr>
<tr>
<td><strong>Sub-totals</strong></td>
<td>1,368</td>
<td>924</td>
<td>1,231</td>
</tr>
<tr>
<td><strong>Long-haul</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>297</td>
<td>1,842</td>
<td>377</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>95</td>
<td>1,859</td>
<td>108</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>25</td>
<td>1,723</td>
<td>48</td>
</tr>
<tr>
<td><strong>Sub-totals</strong></td>
<td>417</td>
<td>1,828</td>
<td>533</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td>2,269</td>
<td>834</td>
<td>2,096</td>
</tr>
</tbody>
</table>

The definition of Non-Southwest Markets has been revised to include airport-pairs with lengths of haul longer than the longest-haul Southwest Market but less than the longest-haul Adjacent Market.

* Wt. Avg. Haul is the weighted average length of haul based on all passengers in all markets in each stratification.

After including the additional long-haul markets up to the longest-haul Adjacent Market, the weighted average length of haul in long-haul markets increased 13.51 percent between 1988 and 1993, with the largest increase occurring
in the high-density long-haul markets in which the weighted average length of haul increased by 20.78 percent. The total weighted average length of haul in Non-Southwest Markets increased 20.26 percent, from 834 miles in 1988 to 1,003 miles in 1993. The observed increases in weighted average lengths of haul in both long-haul markets and overall could account for a significant portion of the observed 29.62 percent increase in weighted average one-way fares in Non-Southwest Markets between 1988 and 1993.

Although the weighted average length of haul increased substantially between 1988 and 1993, the percentage increase in weighted average fares in Non-Southwest Markets is greater, 20.26 percent versus 29.62 percent. Therefore, the observed findings are deemed not to support hypothesis 4.4 which posits that average fares in Non-Southwest Markets decreased between 1988 and 1993.
General hypothesis five

Adjacent Markets are examined to answer two questions regarding market response in airport-pairs not served by Southwest. First, does market response in Adjacent Markets differ from market response in either Southwest Markets or Non-Southwest Markets? Second, does a change occur in market response in Adjacent Markets after Southwest's entry in an airport-pair? Market response in Adjacent Markets is measured by the average number of Origin and Destination passengers per day each way (O&D pdew) and by the average market revenues per day each (revenues pdew).

General hypothesis five: Southwest's presence is correlated with market response in Adjacent Markets.
Results of the test of hypothesis 5.1.

Hypothesis 5.1: In 1993, O&D demand in Corresponding Southwest Markets was higher than the O&D demand in their respective Adjacent Markets.

Table 42 shows the average number of Origin and Destination passengers per day each way in Corresponding Southwest Markets and in their Adjacent Markets.

Table 42 O&D pday in Corresponding Southwest and Adjacent Markets

<table>
<thead>
<tr>
<th>1993 Market Stratifications</th>
<th>Corresponding Southwest Mkt</th>
<th>Adjacent Markets</th>
<th>Southwest Mkt O&amp;D as a Percent of Adjacent Mkt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Mkts.</td>
<td>Average O&amp;D pday</td>
<td># of Mkts.</td>
</tr>
<tr>
<td>Short-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>26</td>
<td>201.5</td>
<td>26</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>28</td>
<td>358.2</td>
<td>28</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>31</td>
<td>640.7</td>
<td>31</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>85</td>
<td>413.3</td>
<td>85</td>
</tr>
<tr>
<td>Medium-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>80</td>
<td>97.2</td>
<td>80</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>44</td>
<td>100.0</td>
<td>44</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>21</td>
<td>108.3</td>
<td>21</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>145</td>
<td>99.7</td>
<td>145</td>
</tr>
<tr>
<td>Long-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>82</td>
<td>93.9</td>
<td>82</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>36</td>
<td>114.2</td>
<td>36</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>29</td>
<td>121.5</td>
<td>29</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>147</td>
<td>104.3</td>
<td>147</td>
</tr>
<tr>
<td>TOTALS</td>
<td>377</td>
<td>172.2</td>
<td>377</td>
</tr>
</tbody>
</table>
Conclusion: Hypothesis 5.1 is supported.

Comment on findings: In Table 42, the Adjacent Markets and their Corresponding Southwest Markets are stratified based on lengths of haul and traffic densities in the Adjacent Markets, which explains why the average O&D pdew in some stratifications in the Corresponding Southwest Markets exceed the cutoffs used to stratify traffic density. For example, low-density markets are defined to have 1 to 50 O&D pdew. The Adjacent Markets and their Corresponding Southwest Markets are stratified jointly using the 1-50 criteria for Adjacent Markets. However, many of the Corresponding Southwest Markets have much higher O&D pdew than their respective low-density Adjacent Markets resulting in the high averages in the low-density stratifications of Corresponding Southwest Markets.

In seven of the nine market stratifications, which account for 86.73 percent of markets, the average number of Origin and Destination passengers per day each way in Corresponding Southwest Markets is substantially higher than the average O&D in the respective Adjacent Markets. In four of the nine stratifications, which account for
57.29 percent of the markets, the average number of O&D pdew in Corresponding Southwest Markets is more than three times the average O&D pdew in the respective Adjacent Markets. In only two market stratifications — high-density medium-haul and high-density long-haul markets which account for 13.26 percent of the markets — are the average number of O&D pdew in Corresponding Southwest Markets less than the average O&D pdew in their respective Adjacent Markets.

In general, as length of haul increases, the ratio of O&D pdew in Corresponding Southwest Markets to O&D pdew in Adjacent Markets decreases. For example, in short-haul markets average O&D pdew in Corresponding Southwest Markets is 255.44 percent of average O&D pdew in the respective Adjacent Markets, but in medium-haul markets the ratio falls to 117.99 percent. In long-haul markets, the average O&D pdew in Corresponding Southwest Markets is 4.75 percent below the average O&D pdew in the respective Adjacent Markets.
Similarly, within each length of haul stratification, the ratio of O&D pdew in the Corresponding Southwest Markets to O&D pdew in the Adjacent Markets tends to fall as the traffic density increases. In low-density markets, average O&D pdew in the Corresponding Southwest Markets averages at least three times the average O&D pdew in comparable low-density Adjacent Markets. However, in two high-density stratifications, average O&D pdew in the Corresponding Southwest Markets is substantially less than the average O&D pdew in the respective Adjacent Markets.

Overall, the average number of O&D passengers per day each way in Corresponding Southwest Markets is 172.2, which is 154.16 percent of the average O&D pdew in the respective Adjacent Markets. The observed results are deemed to support hypothesis 5.1 which posits that O&D pdew in Corresponding Southwest Markets is higher than the average O&D pdew in their respective Adjacent Markets.
Results of the test of hypothesis 5.2.

Hypothesis 5.2: In 1993, O&D demand in Adjacent Markets was higher than the O&D demand in comparable Non-Southwest Markets.

Table 43 shows the average number of O&D passengers per day each way in Non-Southwest Markets and in Adjacent Markets.

Table 43  O&D pdew in Non-Southwest Markets and Adjacent Markets

<table>
<thead>
<tr>
<th>1993 Market Stratifications</th>
<th>Non-Southwest Markets, Revised</th>
<th>Adjacent Markets</th>
<th>Non-Southwest O&amp;D as a Percent of Adjacent Mkt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># Of Mkt.</td>
<td>Average O&amp;D pdew</td>
<td># Of Mkt.</td>
</tr>
<tr>
<td>Short-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>152</td>
<td>32.5</td>
<td>26</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>112</td>
<td>85.5</td>
<td>28</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>68</td>
<td>352.3</td>
<td>31</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>332</td>
<td>115.9</td>
<td>85</td>
</tr>
<tr>
<td>Medium-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>703</td>
<td>27.9</td>
<td>80</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>300</td>
<td>85.5</td>
<td>44</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>228</td>
<td>356.7</td>
<td>21</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>1,231</td>
<td>102.9</td>
<td>145</td>
</tr>
<tr>
<td>Long-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>377</td>
<td>25.0</td>
<td>82</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>108</td>
<td>82.7</td>
<td>36</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>48</td>
<td>315.0</td>
<td>29</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>533</td>
<td>62.8</td>
<td>147</td>
</tr>
<tr>
<td>TOTALS</td>
<td>2,096</td>
<td>94.7</td>
<td>377</td>
</tr>
</tbody>
</table>

The definition of Non-Southwest Markets has been revised to include airport-pairs with lengths of haul longer than the longest-haul Southwest Market but less than the longest-haul Adjacent Market.
**Conclusion:** Hypothesis 5.2 is not supported.

**Comment on findings:** In five of the nine market stratifications, the average O&D pdew in Non-Southwest Markets is less than the average O&D pdew in comparable Adjacent Markets, with the differences ranging from 1.72 percent in medium-density medium-haul markets to 13.79 percent in low-density long-haul markets. The five stratifications in which average O&D pdew in Non-Southwest Markets is less than average O&D pdew in comparable Adjacent Markets account for 58.09 percent of the Adjacent Markets.

In the four stratifications in which the average O&D pdew in Non-Southwest Markets is greater than the average O&D pdew in the comparable Adjacent Markets, the differences range from 3.33 percent in low-density medium-haul markets to 19.42 percent in high-density medium-haul markets.

Clearly, the stratification analysis of O&D pdew in Non-Southwest Markets and Adjacent Markets provides contradictory results. In the largest stratification of Adjacent Markets — low-density long-haul markets —
average O&D pdew in Non-Southwest Markets is 13.79 percent less than the average O&D pdew in the comparable Adjacent Markets. On the other hand, in the second largest stratification of Adjacent Markets — low-density medium-haul markets — average O&D pdew in Non-Southwest Markets is 3.33 percent greater than average O&D pdew in the comparable Adjacent Markets. In medium-haul markets, which account for 38.46 percent of the Adjacent Markets, average O&D pdew in Non-Southwest Markets is 21.78 percent greater than average O&D pdew in the comparable Adjacent Markets. In short-haul and long-haul markets, average O&D pdew in Non-Southwest Markets is 28.37 percent and 42.65 percent less than the average O&D pdew in comparable Adjacent Markets.

Overall, average O&D pdew in Non-Southwest Markets is 94.7, versus average O&D pdew of 111.7 in the respective Adjacent Markets. The observed differences in average O&D pdew between Adjacent Markets and comparable Non-Southwest Markets are substantially less than the observed differences in average O&D pdew between Adjacent Markets and their Corresponding Southwest Markets. In the former,
average O&D pdew in Corresponding Southwest Markets is 154.16 percent of average O&D pdew in Adjacent Markets, while in the latter average O&D pdew in Non-Southwest Markets is 84.78 percent of average O&D pdew in Adjacent Markets.

Based on the contradictory results of the stratification analysis and the relatively small differences in most stratifications, the findings are deemed to not support hypothesis 5.2 which posits that average O&D pdew in Adjacent Markets is higher than the average O&D pdew in comparable Non-Southwest Markets.

Results of the test of hypothesis 5.3.

Hypothesis 5.3: In airport-pairs adjacent to Southwest's 1989-1993 New Markets, 1993 O&D demand was higher than the O&D demand in the year prior to Southwest becoming an effective competitor.

Table 44 shows the average number of O&D passengers per day each way in markets adjacent to New Markets in the year prior to Southwest becoming an effective competitor in the New Market and in 1993.
## Table 44: Average O&D pews in New Adjacent Markets

<table>
<thead>
<tr>
<th>Southwest's Year of Entry</th>
<th>Number of New Adjacent Markets</th>
<th>Average O&amp;D Per Day Each Way</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Year Prior To Entry</td>
</tr>
<tr>
<td>1989</td>
<td>4</td>
<td>96.2</td>
</tr>
<tr>
<td>1990</td>
<td>9</td>
<td>146.7</td>
</tr>
<tr>
<td>1991</td>
<td>5</td>
<td>148.5</td>
</tr>
<tr>
<td>1992</td>
<td>24</td>
<td>107.0</td>
</tr>
<tr>
<td>1993</td>
<td>22</td>
<td>105.4</td>
</tr>
<tr>
<td>AVERAGES</td>
<td>12.8</td>
<td>114.6</td>
</tr>
</tbody>
</table>

**Conclusion:** Hypothesis 5.3 is not supported.

**Comment on findings:** In the new Adjacent Markets created in 1989 through 1992 by Southwest's entry as an effective competitor into a New Market, the average number of O&D passengers per day each way decreased substantially between the year prior to Southwest's entry as an effective competitor and 1993. The decreases ranged from 23.46 percent in the 1992 new Adjacent Markets to 52.01 percent in the 1990 new Adjacent Markets. Only the new 1993 Adjacent Markets exhibited an increase in the average number of O&D pews.
Overall, the average O&D pdew in new Adjacent Markets decreased 20.07 percent from an average of 114.6 for the years prior to Southwest’s entry to 91.6 in 1993. The observed results are deemed to not support hypothesis 5.3 which posits that average O&D pdew in an Adjacent Market increases after Southwest becomes an effective competitor in an adjacent airport-pair.

Results of the test of hypothesis 5.4.

Hypothesis 5.4: Between 1988 and 1993, O&D demand increased in markets among the top 3,000 airport-pairs that were neither Southwest Markets nor Adjacent Markets.

Table 45 shows the average number of O&D passengers per day each way in Non-Southwest Markets in 1988 and in 1993. Non-Southwest Markets exclude markets with longer lengths of haul than the longest-haul Adjacent Market.
Table 45  O&D pdew In Non-Southwest Markets, Revised

<table>
<thead>
<tr>
<th>Market Stratifications</th>
<th>1988</th>
<th>1993</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of MktS</td>
<td>Average O&amp;D, pdew</td>
<td># of MktS</td>
</tr>
<tr>
<td>Short-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>203</td>
<td>31.7</td>
<td>152</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>177</td>
<td>88.1</td>
<td>112</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>104</td>
<td>385.2</td>
<td>68</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>484</td>
<td>128.3</td>
<td>332</td>
</tr>
<tr>
<td>Medium-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>827</td>
<td>26.9</td>
<td>703</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>351</td>
<td>86.9</td>
<td>300</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>190</td>
<td>348.9</td>
<td>228</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>1,368</td>
<td>87.0</td>
<td>1,231</td>
</tr>
<tr>
<td>Long-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>297</td>
<td>24.8</td>
<td>377</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>95</td>
<td>85.7</td>
<td>108</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>25</td>
<td>255.5</td>
<td>48</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>417</td>
<td>52.5</td>
<td>533</td>
</tr>
<tr>
<td>TOTALS</td>
<td>2,269</td>
<td>89.5</td>
<td>2,096</td>
</tr>
</tbody>
</table>
longest Adjacent Market. Compared to the stratification analysis used to test hypothesis 3.3, the only change for the stratification analysis of hypothesis 5.4 is the addition of 27 long-haul markets in 1988 and 199 long-haul markets in 1993.

Once again, results from a stratification analysis of O&D pdew data are contradictory. As discussed in the comment on findings of the stratification analysis of hypothesis 3.3, changes in average O&D pdew in short-haul and medium-haul markets tend to be inconsistent and relatively small within the traffic density stratifications, and inconsistent and relatively large at the aggregate length of haul level. The addition of long-haul Non-Southwest Markets beyond the longest-haul Southwest Market and up to the longest-haul Adjacent Market substantially increases the disparity in long-haul averages, but reduces the overall disparity between 1988 and 1993 results.

Overall, the average O&D pdew in Non-Southwest Markets increased 5.81 percent from 89.5 in 1988 to 94.7 in 1993. Given that the average level of O&D pdew either decreased, or increased by less four percent, in 2,048 markets, which
accounted for 97.71 percent of the Non-Southwest Markets in 1993, the observed results are deemed to not support hypothesis 5.4 which posits that average O&D pdeq in Non-Southwest Markets increased between 1988 and 1993.

_Results of the test of hypothesis 5.5._

_Hypothesis 5.5:_ In 1993, market revenues in Corresponding Southwest Markets were higher than the market revenues in their respective Adjacent Markets.

Table 46 shows the average market revenues per day each way in Corresponding Southwest Markets and the respective Adjacent Markets.
Table 46 Revenues in Corresponding Southwest and Adjacent Markets

<table>
<thead>
<tr>
<th>1993 Market Stratification</th>
<th>Corresponding Southwest Mkt. # of Mkt.</th>
<th>Revenues pdeW</th>
<th># of Mkt.</th>
<th>Revenues pdeW</th>
<th>Southwest Revenues as a Percent of Adjacent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Short-haul</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 Q&amp;D</td>
<td>26</td>
<td>$ 14,125</td>
<td>26</td>
<td>$ 5,104</td>
<td>276.74%</td>
</tr>
<tr>
<td>51-150 Q&amp;D</td>
<td>28</td>
<td>$ 17,004</td>
<td>28</td>
<td>$ 12,557</td>
<td>141.79%</td>
</tr>
<tr>
<td>Over 150 Q&amp;D</td>
<td>31</td>
<td>$ 34,053</td>
<td>31</td>
<td>$ 31,011</td>
<td>109.81%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>85</td>
<td>$ 22,605</td>
<td>85</td>
<td>$ 17,007</td>
<td>132.92%</td>
</tr>
<tr>
<td></td>
<td>Medium-haul</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 Q&amp;D</td>
<td>80</td>
<td>$ 11,077</td>
<td>80</td>
<td>$ 5,122</td>
<td>216.26%</td>
</tr>
<tr>
<td>51-150 Q&amp;D</td>
<td>44</td>
<td>$ 11,879</td>
<td>44</td>
<td>$ 15,651</td>
<td>75.90%</td>
</tr>
<tr>
<td>Over 150 Q&amp;D</td>
<td>21</td>
<td>$ 12,699</td>
<td>21</td>
<td>$ 49,795</td>
<td>25.50%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>145</td>
<td>$ 11,555</td>
<td>145</td>
<td>$ 14,787</td>
<td>78.14%</td>
</tr>
<tr>
<td></td>
<td>Long-haul</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 Q&amp;D</td>
<td>82</td>
<td>$ 17,146</td>
<td>82</td>
<td>$ 6,265</td>
<td>273.58%</td>
</tr>
<tr>
<td>51-150 Q&amp;D</td>
<td>36</td>
<td>$ 19,654</td>
<td>36</td>
<td>$ 17,900</td>
<td>109.80%</td>
</tr>
<tr>
<td>Over 150 Q&amp;D</td>
<td>29</td>
<td>$ 22,956</td>
<td>29</td>
<td>$ 81,363</td>
<td>28.21%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>147</td>
<td>$ 18,903</td>
<td>147</td>
<td>$ 23,930</td>
<td>78.99%</td>
</tr>
<tr>
<td>TOTALS</td>
<td>377</td>
<td>$ 16,912</td>
<td>377</td>
<td>$ 18,853</td>
<td>89.70%</td>
</tr>
</tbody>
</table>

Conclusion: Hypothesis 5.5 is supported.

Comment on findings: In six of the nine market stratifications, which account for 283, or 75.07 percent of the markets, revenues in the Corresponding Southwest Markets are greater than the average revenues in the comparable Adjacent Markets. The differences range from 9.80 percent in medium-density long-haul markets to 176.74
percent in low-density short-haul markets. In four of the nine market stratifications, which account for 57.29 percent of the markets, average revenues in Corresponding Southwest Markets are at least 40.00 percent greater than the average revenues in comparable Adjacent Markets. In the 85 short-haul markets, average market revenues in the Corresponding Southwest Markets are 132.92 percent of the average market revenues per day each way in the respective Adjacent Markets.

In three market stratifications, which account for 24.93 percent of the markets, average market revenues in Corresponding Southwest Markets are less than the average revenues in their respective Adjacent Markets. Moreover, in two of the three market stratifications — high-density medium-haul and high-density long-haul markets, which account for 13.26 percent of the markets — average revenues in Corresponding Southwest Markets are less than one-third of the average market revenues in comparable Adjacent Markets. Although the two stratifications account for a relatively small proportion of the markets, the disparities between the two groups of Corresponding
Southwest Markets and Adjacent Markets are substantially larger than the differences observed in the other seven stratifications.

In only one stratification of Corresponding Southwest Markets — high-density short-haul — do average revenues exceed $30,000. However, there are three stratifications of Adjacent Markets with average revenues greater than $30,000, and one stratification of Adjacent Markets has average revenues in excess of $80,000. The very large average revenues in high-density medium-haul and high-density long-haul Adjacent Markets significantly bolster the overall weighted average in all Adjacent Markets.

Overall, average market revenues per day each way in Corresponding Southwest Markets are $16,912, which are 89.70 percent of the average market revenues of $18,853 in their respective Adjacent Markets. Given that average revenues in the majority of stratifications, which account for the majority of markets, are higher in Corresponding Southwest Markets than the comparable Adjacent Markets, and given the distorting effect of very high revenues in two relatively small stratifications of Adjacent Markets,
the results are deemed to support hypothesis 5.5 which posits that average revenues in Corresponding Southwest Markets are greater than average revenues in comparable Adjacent Markets.

Results of the test of hypothesis 5.6.

Hypothesis 5.6: In 1993, market revenues in Adjacent Markets were higher than the market revenues in comparable Non-Southwest Markets.

Table 47 shows average market revenues per day each way in Non-Southwest Markets and in Adjacent Markets.
Table 47  Revenues per day in Non-Southwest and Adjacent Markets

<table>
<thead>
<tr>
<th>1993 Market Stratifications</th>
<th>Non-Southwest Markets, Revised</th>
<th>Adjacent Markets</th>
<th>Non-Southwest Revenues as a Percent of Adjacent Mkt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>152</td>
<td>26</td>
<td>$ 4,882</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>112</td>
<td>28</td>
<td>$ 11,373</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>68</td>
<td>31</td>
<td>$ 42,892</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>332</td>
<td>85</td>
<td>$ 14,857</td>
</tr>
<tr>
<td>Medium-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>703</td>
<td>80</td>
<td>$ 4,793</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>300</td>
<td>44</td>
<td>$ 13,705</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>228</td>
<td>21</td>
<td>$ 56,529</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>1,231</td>
<td>145</td>
<td>$ 16,547</td>
</tr>
<tr>
<td>Long-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>377</td>
<td>82</td>
<td>$ 5,340</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>108</td>
<td>36</td>
<td>$ 17,224</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>48</td>
<td>29</td>
<td>$ 68,707</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>533</td>
<td>147</td>
<td>$ 13,454</td>
</tr>
<tr>
<td>TOTALS</td>
<td>2,096</td>
<td>377</td>
<td>$ 15,493</td>
</tr>
</tbody>
</table>

The definition of Non-Southwest Markets has been revised to include airport-pairs with lengths of haul longer than the longest-haul Southwest Market but less than the longest-haul Adjacent Market.

Conclusion:  Hypothesis 5.6 is supported.

Comment on findings:  In seven of the market stratifications, which account for 86.21 percent of the Adjacent Markets, the average markets revenues per day each are greater in the Adjacent Markets.  The differences
range from 3.78 percent in medium-density long-haul markets to 15.55 percent in high-density long-haul markets. In two market stratifications — high-density short-haul and high-density medium-haul markets — average market revenues in Adjacent Markets are less than the average market revenues in the comparable Non-Southwest Markets.

In all short-markets, average market revenues in Non-Southwest Markets are 87.36 percent of average market revenues in short-haul Adjacent Markets. However, in medium-haul markets the average market revenues in Non-Southwest Markets are 11.90 percent greater than average market revenues in medium-haul Adjacent Markets. In long-haul markets, average market revenues in Non-Southwest Markets are 56.22 percent of average long-haul revenues in Adjacent Markets.

The highest revenue stratification of Non-Southwest Markets is high-density long-haul with average revenues of $68,707, followed by high-density medium-haul markets with average revenues of $56,529 per day each way. The only
stratification of Adjacent Markets with average revenues in excess of $50,000 is the high-density long-haul stratification whose revenues average $81,363 per day each way.

In both Adjacent Markets and in Non-Southwest Markets, revenues increase significantly as traffic density increases. In all three length of haul stratifications of both Adjacent Markets and Non-Southwest Markets, average revenues in high-density markets are orders of magnitude greater than low-density markets within their respective length of haul stratifications.

Adjacent Markets and Non-Southwest Markets do exhibit slightly different patterns of changes in revenues as length of haul changes. In Adjacent Markets, long-haul markets have the highest average revenue, followed by short-haul and medium-haul markets. In Non-Southwest Markets, medium-haul markets are the highest revenue stratification, followed by short-haul and long-haul.

Overall, average market revenues per day each way in Non-Southwest Markets are $15,493, which are 82.18 percent of
the average market revenues of $18,853 in Adjacent Markets. The findings of the stratification analysis are deemed to support hypothesis 5.6 which posits that average revenues in Adjacent Markets are greater than average revenues in Non-Southwest Markets.

Results of the test of hypothesis 5.7.

**Hypothesis 5.7:** In airport-pairs adjacent to Southwest’s 1989-1993 New Markets, 1993 market revenues were higher than market revenues in the year prior to Southwest becoming an effective competitor.

Table 48 shows the average market revenues per day each way in markets adjacent to New Markets in the year prior to Southwest becoming an effective competitor and in 1993.

<table>
<thead>
<tr>
<th>Southwest’s Year of Entry</th>
<th>Number of Adjacent Markets</th>
<th>Average Market Revenues per Day Year Prior To Entry</th>
<th>1993</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>4</td>
<td>$14,922</td>
<td>$9,136</td>
<td>-38.77%</td>
</tr>
<tr>
<td>1990</td>
<td>9</td>
<td>$16,291</td>
<td>$8,312</td>
<td>-48.98%</td>
</tr>
<tr>
<td>1991</td>
<td>5</td>
<td>$19,576</td>
<td>$9,729</td>
<td>-50.30%</td>
</tr>
<tr>
<td>1992</td>
<td>24</td>
<td>$14,637</td>
<td>$11,159</td>
<td>-23.76%</td>
</tr>
<tr>
<td>1993</td>
<td>22</td>
<td>$14,329</td>
<td>$13,741</td>
<td>9.85%</td>
</tr>
<tr>
<td>AVERAGES</td>
<td>12.9</td>
<td>$15,167</td>
<td>$12,096</td>
<td>-20.25%</td>
</tr>
</tbody>
</table>
Conclusion: Hypothesis 5.7 is not supported.

Comment on findings: In four of the five groups of new Adjacent Markets, average revenues fell by substantial amounts between the year prior to Southwest's entry as an effective competitor in an adjacent New Market and 1993. The declines ranged from 23.76 percent for the 1992 markets to 50.30 percent for the 1991 markets. The only group of new Adjacent Markets to exhibit an increase in average market revenues was the 1993 group.

Overall, average market revenues per day each way decreased 20.25 percent from an average of $15,167 in the years prior to Southwest's entry to $12,096 in 1993. The observed results are deemed to not support hypothesis 5.7 which posits that average market revenues in an Adjacent Market would be lower in 1993 than in the year prior to Southwest becoming an effective competitor in an adjacent New Market.
Results of the test of hypothesis 5.8.

Hypothesis 5.8: Between 1988 and 1993, market revenues increased in markets among the top 3,000 airport-pairs that were neither Southwest Markets nor Adjacent Markets.

Table 49 shows the average market revenues per day each way in Non-Southwest Markets in 1988 and in 1993. Non-Southwest Markets exclude markets with lengths of haul longer than the longest-haul Adjacent Markets in each year.
Table 49 Revenues dew In Non-Southwest Markets, Revised

<table>
<thead>
<tr>
<th>Market Stratifications</th>
<th>1988</th>
<th>1993</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Mkt.</td>
<td>Revenues</td>
<td># of Mkt.</td>
</tr>
<tr>
<td>Short-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>203</td>
<td>$3,571</td>
<td>152</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>177</td>
<td>$9,034</td>
<td>112</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>104</td>
<td>$34,254</td>
<td>68</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>484</td>
<td>$12,162</td>
<td>332</td>
</tr>
<tr>
<td>Medium-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>827</td>
<td>$3,941</td>
<td>703</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>351</td>
<td>$11,931</td>
<td>300</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>190</td>
<td>$45,740</td>
<td>228</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>1,368</td>
<td>$11,796</td>
<td>1,231</td>
</tr>
<tr>
<td>Long-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>297</td>
<td>$4,276</td>
<td>377</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>95</td>
<td>$13,895</td>
<td>108</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>25</td>
<td>$39,850</td>
<td>48</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>417</td>
<td>$8,600</td>
<td>533</td>
</tr>
<tr>
<td>TOTALS</td>
<td>2,269</td>
<td>$11,287</td>
<td>2,096</td>
</tr>
</tbody>
</table>

The definition of Non-Southwest Markets has been revised to include airport-pairs with lengths of haul longer than the longest-haul Southwest Market but less than the longest-haul Adjacent Market.

Conclusion: Hypothesis 5.8 is supported.

Comment on findings: Table 49 presents similar findings to Table 35, which was used in the stratification analysis to test hypothesis 3.6. The only difference between Table 35 and Table 49 is the addition to the
latter of 27 long-haul markets in 1988 and 199 long-
haul markets in 1993 whose lengths of haul were greater
than the longest-haul Southwest Market but less than the
longest-haul Adjacent Market.

In all of the stratifications of Non-Southwest Markets,
1993 revenues were greater than the revenues in comparable
1988 markets, with the differences ranging from 14.87
percent in medium-density medium-haul markets to 72.41
percent in high-density long-haul markets. While some of
the differences in market revenues can be attributed to
differences in average lengths of haul between 1988 and
1993, the observed changes in market revenues are much
greater than the observed changes in average length of
haul.

It has been shown that the weighted average length of haul
in short-haul and medium-haul stratifications of Non-
Southwest Markets changed very little between 1988 and
1993. In long-haul stratifications of Non-Southwest
Markets, the weighted average length of haul did increase
13.51 percent between 1988 and 1993, causing the overall
length of haul in Non-Southwest Markets to increase 20.26
percent. By comparison, average revenues in long-haul stratifications of Non-Southwest Markets increased 56.44 percent, and the overall increase in average market revenues was 37.26 percent between 1988 and 1993.

Average market revenues in Non-Southwest Markets increased from $11,287 per day each way in 1988 to $15,493 per day each way in 1993. The findings are deemed to support hypothesis 5.8 which posits that average revenues in Non-Southwest Markets increased between 1988 and 1993.

Summary of Chapter Four

The chapter has presented the findings of the analyses. The regression analyses provide initial support for the general hypotheses regarding relationships between Southwest's presence and market structure, conduct and response. However, the regression analyses do not support the general hypotheses regarding relationships between Southwest's presence and conduct and response in Adjacent Markets.
In general, findings from the stratification analyses tend to be consistent with the findings of the regression analyses. In particular, the stratification analyses also suggest there is a relationship between Southwest's presence and market structure, conduct and response, although not necessarily as claimed by authors such as Bennett and Craun.

Chapter Five presents a discussion of the conclusions drawn from the findings. In addition, Chapter Five discusses the managerial implications and public policy ramifications of the findings. Chapter Five concludes with several recommendations for future research based on the findings of the empirical analysis of The Southwest Effect.

Table 50 presents a summary of the 27 research hypotheses and whether the results of the stratification analyses were deemed to support the hypotheses. The regression analyses were not used to test the individual hypotheses.
Table 50  Summary of Hypotheses and Stratification Results

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Supported by Results?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structure in Southwest Markets</strong></td>
<td></td>
</tr>
<tr>
<td>1.1 - More effective competitors in Non-Southwest Markets</td>
<td>No</td>
</tr>
<tr>
<td>1.2 - Lower Herf.-Hirschman Index in Non-Southwest Markets</td>
<td>No</td>
</tr>
<tr>
<td>1.3 - Fewer effective competitors in New Markets</td>
<td>No</td>
</tr>
<tr>
<td>1.4 - Higher Herfindahl-Hirschman Index in New Markets</td>
<td>No</td>
</tr>
<tr>
<td>1.5 - Effective competitors fell in Non-Southwest Markets</td>
<td>Yes</td>
</tr>
<tr>
<td>1.6 - Herf.-Hirschman Index rose in Non-Southwest Markets</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Conduct in Southwest Markets</strong></td>
<td></td>
</tr>
<tr>
<td>2.1 - Non-Southwest Mkts’ fares higher than Southwest Mkts’</td>
<td>Yes</td>
</tr>
<tr>
<td>2.2 - Fares fell in New Markets after Southwest entered</td>
<td>Yes</td>
</tr>
<tr>
<td>2.3 - Fares fell in Non-Southwest Markets, 1988 - 1993</td>
<td>No</td>
</tr>
<tr>
<td><strong>Response in Southwest Markets</strong></td>
<td></td>
</tr>
<tr>
<td>3.1 - Non-Southwest Mkts’ O&amp;D less than Southwest Markets’</td>
<td>Yes</td>
</tr>
<tr>
<td>3.2 - O&amp;D rose in New Markets after Southwest entered</td>
<td>Yes</td>
</tr>
<tr>
<td>3.3 - O&amp;D rose in Non-Southwest Markets, 1988 - 1993</td>
<td>Yes</td>
</tr>
<tr>
<td>3.4 - Non-Southwest Mkt revenues less than Southwest Mkts’</td>
<td>No</td>
</tr>
<tr>
<td>3.5 - Revenues rose in New Markets after Southwest entered</td>
<td>Yes</td>
</tr>
<tr>
<td>3.6 - Revenues fell in Non-Southwest Markets, 1988 - 1993</td>
<td>No</td>
</tr>
<tr>
<td><strong>Conduct in Adjacent Markets</strong></td>
<td></td>
</tr>
<tr>
<td>4.1 - Southwest Markets’ fares less than Adjacent Markets’</td>
<td>Yes</td>
</tr>
<tr>
<td>4.2 - Adjacent Markets’ fares less than Non-Southwest Mkts’</td>
<td>No</td>
</tr>
<tr>
<td>4.3 - Adjacent Markets’ fares fell after Southwest entered</td>
<td>No</td>
</tr>
<tr>
<td>4.4 - Fares fell in Non-Southwest Markets, 1988 - 1993</td>
<td>No</td>
</tr>
<tr>
<td><strong>Response in Adjacent Markets</strong></td>
<td></td>
</tr>
<tr>
<td>5.1 - Southwest Markets’ O&amp;D more than Adjacent Markets’</td>
<td>Yes</td>
</tr>
<tr>
<td>5.2 - Adjacent Markets’ O&amp;D more than Non-Southwest Mkts’</td>
<td>No</td>
</tr>
<tr>
<td>5.3 - Adjacent Markets’ O&amp;D rose after Southwest entered</td>
<td>No</td>
</tr>
<tr>
<td>5.4 - O&amp;D rose in Non-Southwest Markets, 1988 - 1993</td>
<td>No</td>
</tr>
<tr>
<td>5.5 - Southwest Markets’ revenues more than Adjacent Mkts’</td>
<td>Yes</td>
</tr>
<tr>
<td>5.6 - Adjacent Mkts’ revenues more than Non-Southwest Mkts’</td>
<td>Yes</td>
</tr>
<tr>
<td>5.7 - Adjacent Mkts’ revenues rose after Southwest entered</td>
<td>No</td>
</tr>
<tr>
<td>5.8 - Revenues rose in Non-Southwest Markets, 1988 - 1993</td>
<td>Yes</td>
</tr>
</tbody>
</table>
CHAPTER V: SUMMARY AND CONCLUSIONS

Introduction

Chapter Five consists of five parts. Part one of the chapter summarizes the objectives, general hypotheses and analytical steps of the study. The second part presents the conclusions reached from the analysis of the data. Part three discusses the managerial and policy implications of the findings. The fourth part presents several issues which emerged during the analysis and were deemed worthy for further consideration. The final part summarizes Chapter Five.

Research summary

Before discussing the conclusions and implications of the study, the research objectives and methods are reviewed.
Research objectives

The primary objective of the study is to determine the extent to which the presence of Southwest Airlines, one of the smallest major carriers but the largest low-fare airline, is related to the structure, conduct and response of airport-pair markets in the domestic airline industry. The study is motivated by many claims, including a study by Bennett and Craun (1993) for the U.S. Department of Transportation, that The Southwest Effect is the driving force in the airline industry. However, unlike the Bennett and Craun report, the present study of The Southwest Effect does not presume to attribute cause and effect. Rather, the present study seeks to explore in greater detail the relationships that might exist between Southwest's presence and the structure, conduct or response of airport-pairs.

The study also is motivated by Southwest's status as a role model for new entrant carriers and for established carriers seeking to develop their own low-fare operations. In addition, the analysis of market structure, conduct and response is designed to provide industry analysts with new
insights for understanding and explaining behavior in the deregulated airline industry.

To determine whether Southwest’s presence is related to market structure, conduct or response, the study posits five general hypotheses and 27 specific research hypotheses. The five general hypotheses are:

**General hypothesis one:** The structure of airport-pair markets is correlated with Southwest’s presence.

**General hypothesis two:** The conduct of carriers in airport-pair markets is correlated with Southwest’s presence.

**General hypothesis three:** Southwest’s presence is correlated with market response.

**General hypothesis four:** The conduct of carriers in Adjacent Markets is correlated with Southwest’s presence in airport-pair markets.

**General hypothesis five:** Southwest’s presence is correlated with market response in Adjacent Markets.

The purpose of the study is not to design a predictive model of market behavior nor an analytical model for evaluating market performance relative to an economic theory. Rather, the study utilizes the market structure-
conduct-performance paradigm as a basic framework for an empirical analysis of what is posited to be a major force of change in the domestic airline industry. In the study, the basic structure-conduct-performance paradigm is modified to examine market response rather than performance.

The structure-conduct-performance paradigm defines market structure as the characteristics of a market that affect relationships between buyers and sellers. The paradigm defines market conduct as the behaviors of buyers and sellers in the market. Market response is defined as the outcome of the combined behaviors of both buyers and sellers in the market.

Review of the methodology

Annualized data for the study comes from the U.S. Department of Transportation’s annual “Origin and Destination Survey of Air Passenger Traffic” (the O&D Survey). The 1989-1993 time period is used because it covers the bottom of the industry’s latest profit cycle.
The data set is drawn from the top 3,000 revenue markets in the continental U.S..

To explore The Southwest Effect, two types of analysis were utilized — regression and market stratification. Prior to undertaking either type of analysis, the top 3,000 airport-pair markets were screened to determine whether each was a Southwest Market or an Adjacent Market. A Southwest Market is defined as an airport-pair in the top 3,000 in which Southwest has at least a 10.00 percent of the market revenues. An Adjacent Market is defined as an airport-pair in the top 3,000 in which one airport in the pair is served by Southwest and the other airport is within 150 miles of another airport served by Southwest. In 1993, there were 307 Southwest Markets and 377 Adjacent Markets.
Regression analyses

The objective of the regression analyses is not to develop a model of The Southwest Effect, but rather to provide an initial screening of whether Southwest's presence is statistically correlated with market structure, conduct or response. Five regressions were undertaken — two on market structure, one on market conduct and two on market response. Regression analyses were performed on the entire data set of 3,000 observations.

Dependent variables in the regressions were: (i) the number of effective competitors and the Herfindahl-Hirschman Index in the regressions of market structure; (ii) the weighted average one-way fare in the regression of market conduct; and (iii) the weighted average market revenues per day each way and average number of Origin and Destination passengers per day each way in the regressions of market response. The independent variables were: (i) dummy variables for Southwest Markets, Adjacent Markets, Tourist markets, Hub airports, and Slot-constrained airports; (ii) weighted average length of haul; (iii) average number of Origin and Destination passengers per
day each way; and (iv) interaction terms for (a) average number of Origin and Destination passengers per day each way and (b) weighted average length of haul in Southwest Markets. The issue of potentially endogenous variables was addressed.

In all five regressions, the dummy variable for Southwest Market is deemed statistically significant, and the signs of the coefficients are consistent with expectations. Moreover, among the independent variables in each of the five regressions, the coefficients of the Southwest Market dummy variable have the largest values. The regression analyses suggest there is a relationship between Southwest's presence and structure, conduct and response. However, some of the Southwest Market interaction terms are significant, which suggests the estimated relationships do not extend equally across all markets and appear to diminish as length of haul increases.

The dummy variable for Adjacent Market is significant in only the regressions of market structure. Contrary to expectations based on anecdotal evidence presented in Chapter One, the dummy variable for Adjacent Market is not
significant in the regressions of either market conduct or response.

Overall, the regression analyses provide initial support for the hypothesized relationships between Southwest's presence and structure, conduct and response in Southwest Markets. On the other hand, the regression analyses also suggest the hypothesized relationships do not apply to conduct or response in Adjacent Markets. To further explore the hypothesized relationships of The Southwest Effect, a series of stratification analyses were undertaken.

**Stratification analyses**

The stratification analyses focus more closely on differences between comparable markets. Prior to undertaking the stratification analyses, each of the top 3,000 airport-pairs was classified into one of three groups — Southwest Markets, Adjacent Markets and Non-Southwest Markets. The sets of Southwest Markets and Adjacent Markets used in the stratification analyses are
the same airport-pairs used in the regression analyses. However, for the stratification analyses, Non-Southwest Markets are defined as airport-pairs in the top 3,000 that are neither Adjacent Markets nor Southwest Markets, are not served by Southwest and had lengths of haul less than the longest-haul Southwest Market.

In the stratification analyses of the first three general hypotheses, the data set consists of 307 Southwest Markets and 1,897 Non-Southwest Markets. In the stratification analyses of the last two general hypotheses involving Adjacent Markets, the data set consists of 377 Adjacent Markets and 2,096 Non-Southwest Markets. In the analyses of Adjacent Markets, the definition of Non-Southwest Markets is revised slightly to include airport-pairs with lengths of haul up to the longest-haul Adjacent Market, which adds 199 more airport-pairs to the 1993 Non-Southwest Markets.

The sets of Southwest Markets, Adjacent Markets, and Non-Southwest Markets were stratified by length of haul and traffic density to enable analyses of market structure, conduct and response among comparable markets.
Consistent with industry practice and prior studies such as Transportation Research Board (1991), each airport-pair in the sets of Southwest Markets, Adjacent Markets, and Non-Southwest Markets was grouped into one of nine stratifications based on length of haul — short-haul (under 500 miles), medium-haul (500 to 1,500 miles) and long-haul (over 1,500 miles) — and traffic density — low-density (1 to 50 O&D pdew), medium-density (51 to 150 O&D pdew), and high-density (over 150 O&D pdew). Averages for each stratification were computed, and the averages for Southwest Markets, Adjacent Markets, and Non-Southwest Markets were compared to provide the bases for the analyses.
Conclusions

This section discusses the conclusions drawn from the results of both the regression analyses and the stratification analyses.

_Southwest's presence and market structure_

Results from the regression analyses of market structure suggest Southwest Markets have 0.52 fewer competitors and are 13.83 percent more concentrated than the top 3,000 airport-pairs in which Southwest is not an effective competitor. An effective competitor is defined as an airline with at least a 10.00 share of the market's aggregate revenues. The coefficients of the Southwest Market dummy variable are consistent with the conclusions of the study prepared by Bennett and Craun, who argued Southwest is dominating the markets it serves.

However, the regression analyses also suggest the estimated correlation between Southwest's presence and market structure diminishes as length of haul increases.
In markets beyond 561 miles, the estimated average number of effective competitors in Southwest Markets is greater than the estimated average number of effective competitors in airport-pairs ranked in the top 3,000 that are neither Adjacent Markets nor Southwest Markets. In 1993, the weighted average length of haul in all Southwest Markets was 560 miles.

The average number of effective competitors is one valid and widely-used measure of market structure, but the measure does not provide a complete picture of the market characteristics that might influence relationships between buyers and sellers. For example, the measure indicates only the number of competitors in a market, but not each competitor’s relative share of the market. The measure does not distinguish between markets with three equal-sized competitors and a market in which two small fringe-firms compete with a much larger dominant firm. Consequently, analyses of market structure typically use a second measure — the Herfindahl-Hirschman Index — to indicate the relative market shares of the firms in the market. The number of effective competitors and the
Herfindahl-Hirschman Index provide complementary measures of market structure.

The Herfindahl-Hirschman Index is the sum of the squared market shares of firms in the market. As a preliminary step in the analysis of market structure, each carrier's share of market revenues was squared and summed to derive the market's Herfindahl-Hirschman Index. The Herfindahl-Hirschman Index provides a guideline of the relative concentration of market shares — the closer the Herfindahl-Hirschman Index is to 1.0000, the greater the concentration of market share in a single firm.

The regression analysis suggests the typical airline market among the top 3,000 airport-pairs is correlated with a relatively high degree of concentration — the estimated Herfindahl-Hirschman Index is 0.66905. The regression coefficient of the Southwest Market dummy variable implies Southwest's presence as an effective competitor in the market is correlated with an increase in the level of concentration by approximately 13.83 percent, which is consistent with the finding that Southwest
Markets tend to be correlated with one-half less effective competitor. However, the coefficient of the Southwest Market*length of haul interaction variable suggests the relationship between the level of concentration and Southwest's presence diminishes as the length of haul increases, so that in markets beyond 662 miles the estimated level of concentration in Southwest Markets falls below the industry average.

The regression analyses of market structure in the top 3,000 markets suggest there might be a relationship between Southwest's presence and the number of effective competitors and the level of concentration. However, the regression analyses also indicate the relationship described by Bennett and Craun (i.e., Southwest Markets are less competitive and more concentrated) is limited to markets with relatively short lengths of haul. As length of haul increases, the estimated relationship decreases, such that in some medium-haul and long-haul markets, the hypothesized relationship between Southwest's presence and market structure appears to be the opposite of the relationship claimed by Bennett and Craun.
The regression analyses of market structure provide some initial insights into the relationship between Southwest's presence and market structure. To further explore the hypothesized correlation between Southwest's presence and market structure, stratification analyses were undertaken.

Although they study the same issues, the findings of the regression analyses and the stratification analyses are not strictly comparable because they are based on different data sets. The regression analyses include all airport-pairs in the top 3,000 markets, while the stratification analyses exclude Non-Southwest Markets that are either airport-pairs in which both airports are served by Southwest or have lengths of haul longer than the longest-haul Southwest Market. Nevertheless, the two data sets do provide similar findings regarding the hypothesized relationship between Southwest's presence and market structure.

The regression analyses suggest when length of haul is considered, Southwest Markets appear to be as competitive as Non-Southwest Markets, and the stratification analyses
present similar findings. In short-haul stratifications under 500 miles, the average number of effective competitors in Southwest Markets is 1.620, which is ten percent greater than the average number in short-haul Non-Southwest Markets. In medium-haul stratifications, there are an average of 2.662 effective competitors in Southwest Markets, which is 12.94 percent greater than the average number of effective competitors in medium-haul Non-Southwest Markets. In long-haul stratifications, there are an average of 3.638 effective competitors in Southwest Markets, which is 32.24 percent greater than the average number of effective competitors in comparable Non-Southwest Markets, which average less than three effective competitors in long-haul markets.

The findings of the stratification analysis suggest the majority of Southwest Markets are at least as competitive as Non-Southwest Markets. One notable exception is high-density short-haul markets where the average number of effective competitors in Southwest Markets of 1.559 is 9.41 percent less than in Non-Southwest Markets. The exception is especially notable because the high-density short-haul stratification accounts for 22.15 percent of
all Southwest Markets, and it is the least competitive of the nine stratifications of Southwest Markets.

The relatively low number of effective competitors in the high-density short-haul stratification of Southwest Markets probably is due to the inclusion of 13 airport-pairs involving Dallas Love Field (e.g., Dallas Love-Houston and Dallas Love-New Orleans), which Southwest serves exclusively under the limitations of the Wright Amendment. In all 13 airport-pairs, which rank among Southwest's top revenue markets, Southwest enjoys an absolute monopoly. Being the only effective competitor in 13 of the 68 markets would account for the relatively low average number of effective competitors in the high-density short-haul stratification of Southwest Markets. If the 13 Dallas Love airport-pairs are excluded, the average number of effective competitors in the remaining 55 high-density short-haul Southwest Markets is 1.691, which is only 1.74 percent less than the average number of effective competitors in the comparable stratification of Non-Southwest Markets.
The stratification analysis suggests Southwest Markets appear to be at least as competitive as Non-Southwest Markets when market structure is measured by the number of effective competitors. However, an analysis of market structure relying solely on the number of effective competitors would not reveal the relative market shares of the effective competitors. Indeed, one of the concerns expressed by Bennett and Craun is that Southwest is dominating the markets it serves. If true, then Southwest Markets might be characterized by one dominant carrier with a very large market share (i.e., Southwest) and one or two much smaller carriers who garnered just enough market share to be counted as effective competitors. Such a condition would be consistent with the findings of the stratification analysis.

A carrier with a dominant share is in a position to exercise market power if a weak competitive fringe cannot discipline the dominant carrier. Therefore, an analysis of market structure must consider not only the number of effective competitors in the market, but also the relative share of each carrier in the market. The Herfindahl-Hirschman Index provides a measure of relative market
share of the carriers in a market. The Herfindahl-Hirschman Index is computed as the sum of the squared market share of each carrier in the market. A value of 1.00000 indicates a perfect monopoly.

The stratification analysis of market structure comparing mean values of the Herfindahl-Hirschman Index suggests Southwest Markets appear to be generally less concentrated than comparable Non-Southwest Markets, which, in turn, could suggest Southwest is no more dominant in its markets than other carriers are in theirs.

The finding is noteworthy because Southwest has a perfect monopoly in 15 markets out of Dallas' Love Field (13 high-density short-haul and two high-density medium-haul), and the Herfindahl-Hirschman Index in the 15 markets is 1.00000. Given that the Herfindahl-Hirschman Index is 1.00000 in the 15 Southwest Markets and that the overall mean value of the Herfindahl-Hirschman Index for all Southwest Markets is lower than the overall mean for all Non-Southwest Markets, it appears that Southwest Markets not involving Dallas Love Field are at least as competitive as Non-Southwest Markets.
Except for the high-density short-haul stratification which includes the 13 Dallas Love airport-pairs, the mean Herfindahl-Hirschman Index in most stratifications of Southwest Markets generally is less than the mean Herfindahl-Hirschman Index in comparable stratifications of Non-Southwest Markets, which could suggest that if Southwest is dominating the markets it serves, the level of market domination is no greater than the level of domination achieved by the largest carrier in comparable markets not served by Southwest.

Bennett and Craun's concerns regarding Southwest's market domination could have been based on the high degree of market concentration evident in some market stratifications, such as the high-density short-haul stratification where the mean value of the Herfindahl-Hirschman Index is a relatively high 0.7589. However, the stratification analysis suggests that both Southwest Markets and Non-Southwest Markets tend to be highly concentrated in the short-haul market stratifications, but the level of concentration appears to decrease substantially as length of haul increases. The
stratification analysis suggests that a high degree of market concentration is a characteristic of most short-haul markets, and might not necessarily be related to Southwest’s entry.

It seems logical to conclude short-haul Southwest Markets and Non-Southwest Markets have fewer competitors and are more concentrated than medium-haul or long-haul markets because of fewer routing options over competing airlines’ hubs. Travelers in short-haul markets are less willing to accept a circuitous routing over a carrier’s distant hub airport. Therefore, there are fewer competitors in short-haul markets, and the one carrier that best serves the market (i.e., provides the most direct routing) probably achieves a relatively large market share. In medium-haul and long-haul markets, where circuitous routings are less onerous to passengers, carriers not offering direct service can offer lower-priced connecting service over competing hubs, thereby attracting sufficient passenger traffic to impact the market share of the dominant carrier.
Although the stratification analysis suggests
Southwest Markets appear to be as competitive as Non-
Southwest Markets, Southwest's entry as an effective
competitor does appear to be related to a short-term
change in market structure. The hypothesized relationship
between Southwest's presence and market structure might be
evident from the comparisons of the market structure
before and after Southwest enters an airport-pair. To
analyze changes in market structure, the study examined
107 New Markets entered by Southwest between 1989 and
1993.

New Markets are defined as airport-pairs which were
Southwest Markets at yearend 1993 and which had become
Southwest Markets for the first time between 1989 and
1993. The analysis of New Markets compares the market
structure in 1993 with the market structure in the year
prior to Southwest offering service to both airports in
each New Market. Although the study is not designed to
observe the behavior of specific carriers in specific
markets, the observed patterns of change in the New
Markets appear to be consistent with competitive behavior
in which a new firm enters and one of the incumbent firms withdraws from the market.

The mean number of effective competitors in the 22 New Markets in 1993 was 2.818 versus 2.091, a difference of nearly one full competitor. Of course, Southwest’s entry as an effective competitor would be expected to increase the number of effective competitors by exactly one. An increase of less than one might suggest either the withdrawal of an incumbent competitor or the diversion of a sufficient proportion of market revenues from an incumbent to Southwest (e.g., one less carrier with at least a 10.00 percent market share). In either case, an incumbent would no longer be counted as an effective competitor in the market.

A plausible conclusion drawn from a year-by-year analysis of New Markets suggests there might be a four-year process whereby Southwest replaces one incumbent in the New Markets. For example, one year after Southwest’s entry, the number of effective competitors in the New Markets appears to increase by 0.818 (e.g., 1993 versus 1992); two years after entry the difference in the mean number of
effective competitors appears to be 0.500 (e.g., 1993 versus 1991); three years after entry the difference in the mean number of effective competitors is 0.400 (e.g., 1993 versus 1990); and in the fourth and fifth years after entry, the mean number of effective competitors in the New Markets appears to return to the nearly same levels that existed prior to Southwest's entry. Therefore, it appears there might be a relationship between Southwest's entry and a four-year process by which Southwest replaces an incumbent competitor. At the end of the hypothesized process, the airport-pair appears to have the same number of effective competitors that had been in place prior to Southwest's entry.

The hypothesized process of Southwest replacing an incumbent appears to be consistent with the claims by Bennett and Craun who observed carriers cannot compete with Southwest and withdraw from markets Southwest enters. However, evidence from the stratification analysis suggests Southwest appears to replace only one incumbent and after the replacement process has been completed, Southwest Markets appear to remain relatively competitive,
with an average of about two-and-one-half effective competitors — the same level that existed prior to Southwest’s entry. Moreover, an analysis of the Herfindahl-Hirschman Index tends to suggest there is no relationship between Southwest’s entry and a permanent change in the level of market concentration.

In the 22 New Markets Southwest entered in 1993, the mean level of the Herfindahl-Hirschman Index was lower in 1993 than in 1992, the year prior to entry. The finding suggests Southwest enters but does not immediately dominate New Markets, therefore, the New Markets become less concentrated with the addition of one more competitor. Over time, the mean Herfindahl-Hirschman Index in the New Markets appears to approach the level that existed prior to Southwest’s entry, which suggests Southwest’s share appears to approximate the market share held by the displaced incumbent. Furthermore, given that the mean levels of the Herfindahl-Hirschman Index in New Markets four and five years after entry appear to be nearly identical to the levels that existed prior to Southwest’s entry and given that those levels appear to be in line with industry averages, it appears the markets
remain relatively competitive even five years after Southwest's entry.

Therefore, one plausible explanation is that when Southwest enters a New Market it displaces one incumbent carrier, and if Southwest becomes the dominant carrier in the New Market, its level of domination appears to be no greater than the level achieved by the incumbent Southwest displaces. If true, the finding suggests that the degree of market concentration that concerned Bennett and Craun might have existed in the market even before Southwest entered. Therefore, the evidence suggests the relationship between Southwest's entry and market structure appears to be the displacement of a single incumbent, resulting in no long-term change in the number of effective competitors or the level of market concentration. Moreover, if the hypothesized displacement results in lower fares, the traveling public is better served.

To put the observed changes in market structure in Southwest Markets into a broader industry perspective, stratification analyses of market structures in Non-
Southwest Markets in 1988 and 1993 were undertaken. The 1988 to 1993 time period covers the same years used in the analysis of New Markets, and the findings from the analysis of changes in Non-Southwest Markets provide guidelines for evaluating the observed changes in the New Markets.

In Non-Southwest Markets, the mean number of effective competitors decreased 6.74 percent to 2.271 and the mean Herfindahl-Hirschman Index increased 9.71 percent to 0.52044 between 1988 and 1993, which suggest Non-Southwest Markets have become less competitive. The findings appear to be consistent with prior studies, such as Borenstein (1992), Evans and Kessides (1993a, 1993b) and Belobaba and Van Acker (1994), that observed the industry has become more concentrated since the mid-1980s, the period associated with the demise of the first generation of post-deregulation new entrant carriers. Therefore, it is important to have observed that while Non-Southwest Markets appear to have become less competitive, Southwest Markets appear to have become more competitive.
For example, in 1989 Southwest became an effective competitor in 31 New Markets, and by 1993 the number of effective competitors had increased 2.32 percent to 2.871 and the Herfindahl-Hirschman Index had decreased 3.65 percent to 0.41251 in those 31 New Markets. The observed changes in the structure of Southwest Markets contrast sharply with the observed changes in the structure of Non-Southwest Markets. In Southwest Markets, the number of effective competitors appears to have been increasing and the level of market concentration appears to have been decreasing, while just the opposite is observed to occur in Non-Southwest Markets. Therefore, the findings suggest the observed changes in the structure of Southwest’s New Markets might be related to Southwest’s entry as an effective competitor and might not be related to a broader industry-wide trend towards more competitive markets.
Summary of Southwest’s presence and market structure:

The analysis of market structure sought to answer two questions. First, do Southwest Markets have a different structure than airport-pairs in which Southwest is not an effective competitor? Second, does a change in market structure occur after Southwest’s entry in an airport-pair market? Market structure is measured by the average number of effective competitors and by the Herfindahl-Hirschman Index.

In answer to the first question, the analyses suggest there appear to be differences in structure between Southwest Markets and Non-Southwest Markets. The findings suggest Southwest Markets, except for 15 airport-pairs involving Dallas Love Field, appear to be more competitive than comparable Non-Southwest Markets. In general, Southwest Markets appear to have more effective competitors and lower levels of market concentration than comparable Non-Southwest Markets.

In answer to the second question, the analyses suggest there might be a short-term change in market structure
related to Southwest's entry into New Markets, but the analysis did not suggest the existence of a lasting relationship between Southwest’s entry and market structure. Based on the findings of the analyses, one plausible explanation of the relationship between Southwest’s entry and market structure is the following: Southwest’s entry into a New Market might be related with the displacement of one incumbent carrier from the market, with no apparent significant long-term change in either the average number of competitors or the level of concentration in the New Market.

There is no evidence to suggest after Southwest enters a market it becomes any more dominant than the incumbent carrier Southwest displaces. The findings suggest that in markets where Bennett and Craun found domination by Southwest, the markets might have been dominated by another carrier prior to Southwest’s entry. Indeed, the observed changes in the structure of Southwest’s New Markets appear to differ from the observed changes in the structure of Non-Southwest Markets. The former appeared to become more competitive and less concentrated, while
the latter appeared to become less competitive and more concentrated.

It is concluded The Southwest Effect relates to the following characteristics of market structure:

1. Southwest's presence as an effective competitor appears to be correlated with more effective competitors and lower concentration vis-à-vis comparable markets where Southwest is not an effective competitor;

2. The correlation between Southwest's presence and more competitive markets vis-à-vis Non-Southwest Markets appear to weaken as length of haul increases; and

3. Southwest's entry into a New Market appears to be correlated with the displacement of one incumbent from the market, but with no significant long-term change in the market's structure.
Southwest's presence and market conduct

The empirical analysis of market conduct is designed to answer two questions. First, is carrier conduct in Southwest Markets differ from conduct in comparable Non-Southwest Markets? Second, is Southwest's entry as an effective competitor related to conduct in an airport-pair market? Market conduct is measured by the weighted average one-way fare of the carriers in an airport-pair market.

The regression analysis of market conduct reveals that Southwest's presence as an effective competitor appears to be correlated with a reduction in the weighted average one-way fare of $93.40. However, coefficients for the Southwest Market*length of haul and Southwest Market*O&D pdew interaction terms are significant and positive, which suggest the correlation between Southwest's presence and market fares decreases as mileage and traffic density increase. Holding everything else constant, the regression coefficients estimate the disparity between fares in Southwest Markets and Non-Southwest Markets disappears in markets beyond 2,516 miles. However, the
longest-haul Southwest Market in the data set is Cleveland-Oakland, a distance of 2,239 miles.

The regression analysis provides initial insights into the hypothesized relationship between Southwest’s presence and market conduct, and provides an answer to the first question. The evidence suggests fares in Southwest Markets appear to be lower. The stratification analysis further confirms Southwest’s reputation as a low-fare carrier — the weighted average fare in all Southwest Markets is 55.86 percent less than the weighted average fare in all Non-Southwest Markets ($70.06 versus $158.72). Markets where Southwest is an effective competitor appear to have significantly lower fares, but the analysis seeks to gain additional insights into market conduct. The focus of the stratification analysis is on the hypothesized relationship between Southwest’s presence and market conduct, which requires more than a comparison of market averages.

For example, in an airport-pair where Southwest is an effective competitor, the average fare in the market would be expected to decline if Southwest introduces a low-fare
which is then included in the market’s average. Therefore, relying exclusively on changes in the market’s average fare does not provide any insights into how competitors respond to Southwest’s low-fare entry. Unfortunately, neither the actual fares charged by each carrier nor the number of tickets sold at each fare are contained in the O&D Survey used in the analysis. However, it is possible to make some inferences regarding competitors’ conduct from the comparisons of market averages. For example, for each Southwest Market, the market’s weighted average fare is computed two ways — with and without Southwest’s fares and traffic data. The two averages are used to infer how competitors’ conduct might have been related to Southwest’s entry.

The weighted average fare in all Southwest Markets when Southwest’s fares are excluded is significantly less than the weighted average fare in all Non-Southwest Markets ($88.88 versus $158.72). However, the stratification analysis also shows that the weighted average one-way fare in all Southwest Markets when Southwest’s fares are excluded is significantly greater than the weighted
average one-way fare in all Southwest Markets when Southwest's fares are included ($88.88 versus $70.06).

Two conclusions regarding market conduct can be inferred from the market averages. First, average fares in Southwest Markets are significantly lower than the $158.72 average fare in Non-Southwest Markets in both cases (i.e., Southwest fares included and excluded). The finding suggests carriers other than Southwest appear to offer more capacity at discount fares in Southwest Markets than is offered in Non-Southwest Markets. Second, including Southwest's fares lowers the market average which suggests Southwest appears to be selling more tickets at lower prices than competing carriers, which confirms Southwest's reputation as a low-fare carrier.

Both conclusions appear to be consistent with an assumption that Southwest's competitors use revenue management systems to selectively offer some capacity at Southwest's lower fare in Southwest Markets, while still selling some inventory at the higher prices charged in markets where Southwest does not compete. The net result appears to be Southwest Markets have lower fares because
(i) Southwest offers low fares and (ii) competing carriers offer more of their seat capacity at lower prices. Further evidence of the hypothesized relationship between Southwest's presence and market conduct appears to be unveiled in the analysis of New Markets.

By analyzing fares in the 107 New Markets, it might be possible to infer if Southwest only enters low-fare markets or if Southwest's entry is correlated with a change in fares. Moreover, the analysis of New Markets might provide some insight into competitive behavior prior to Southwest's entry. For example, do competitors preemptively lower fares to discourage Southwest's entry?

The stratification analysis suggests Southwest's entry into 107 New Markets between 1989 and 1993 is correlated with substantial and permanent declines in the New Markets' weighted average one-way fares. The findings suggest (i) Southwest's entry is correlated with a change in market conduct and (ii) competitors do not preemptively lower their fares to discourage Southwest's entry. For example, the weighted average fares in the 50 New Markets Southwest entered in 1989 and 1990 were still more than 30
percent lower in 1993 than the weighted average fares in the markets prior to Southwest’s entry. The findings are consistent with Call and Keeler (1985) who observed fares do not change until after a competitor enters a market, and the mere threat of entry does not affect conduct.

Excluding Southwest’s fares changes the degree but not the direction of the outcome. The 1993 weighted average fare in New Markets excluding Southwest’s fares is lower than the prior years’ fare, but the average 1993 New Market fare excluding Southwest’s fares is higher than the average 1993 New Market fare when Southwest’s fares are included. The finding suggests the conduct of other carriers might be related to Southwest’s entry into an airport-pair market. In particular, it is plausible to conclude that after Southwest enters, the remaining incumbents in the market use revenue management techniques to selectively match Southwest’s low fare, which would result in the incumbents’ average fares declining but not to the level of Southwest’s average fare.
To put the declines in average fares in Southwest's New Markets into perspective, it is interesting to compare trends in air fares in Non-Southwest Markets. Between 1988 and 1993, the weighted average fare in Non-Southwest Markets increased 26.45 percent overall and rose 35.26 percent in short-haul markets. The observed fare increases in Non-Southwest Markets appear to be consistent with prior studies, including Hurdle et al. (1989), Borenstein (1989) and Morrison and Winston (1990). The prior studies conclude market structure and market conduct are highly correlated (i.e., as competition decreases, fares increase).

It has been shown that between 1988 and 1993, Non-Southwest Markets became less competitive. Accordingly, it is possible the rise in average fares in Non-Southwest Markets could be related to the increased market powers of the dominant carriers. For example, in high-density short-haul markets, the Herfindahl-Hirschman Index in Non-Southwest Markets increased 26.36 percent and the weighted average one-way fare in that stratification increased 36.92 percent between 1988 and 1993.
By comparison, weighted average one-way fares in the 31 New Markets Southwest entered in 1989 decreased 32.38 percent between 1988 and 1993. Even when Southwest's fares are excluded from the market averages, fares in the 31 New Markets were still 18.10 percent lower in 1993 than they had been in 1988, the year prior to Southwest's entry. The substantial declines in average fares in Southwest's New Markets between 1988 and 1993 do not appear to reflect an industry-wide trend. There are three other noteworthy conclusions from the analysis of conduct in the New Markets.

First, it is interesting to relate changes in market structure to changes in market conduct in Southwest's New Markets. The analysis of market structure has shown that the average number of effective competitors in the 1989 New Markets increased slightly between 1988, the year prior to Southwest's entry, and 1993. The rise in the number of effective competitors indicates the 31 New Markets became slightly more competitive. Based on the findings of prior studies such as those just cited, the 31 New Markets should have experienced a slight decrease in average fares. However, the 32.38 percent decline in
Southwest's New Market fares appears to be much larger than warranted by the slight change in market structure.

For example, Hurdle et al. (1989) found that a reduction in the number of incumbents from three to two (a decrease of 33.3 percent) is correlated with a price increase of 4.1 percent to 12.4 percent, and Borenstein (1991) found a one percent increase in a carrier's share is correlated with a 0.03 percent to 0.22 percent increase in price. By comparison, in the 1989 New Markets, fares dropped 32.38 percent on a 2.32 percent increase in the number of effective competitors. While it is true the present study and the prior works differ markedly in their methodologies and objectives, which precludes the strict application of their findings to the present study, the findings of the present study do stand in stark contrast to conclusions of the prior studies.

It appears, fares in Southwest's New Markets dropped more than would have been predicted by the prior studies based on the slight increase in the number of effective competitors. Therefore, the findings of this study
suggest market conduct is correlated with both (i) the structure of the market and (ii) the specific identity of the carriers serving the market, a conclusion consistent with prior work by Call and Keeler (1985) and Bailey, Graham and Kaplan (1985).

A second noteworthy conclusion drawn from the analysis of New Markets pertains to the potential for The Southwest Effect to extend beyond short-haul markets. Both the regression analysis and the stratification analysis have suggested the estimated disparity between Southwest's fares and competitors' fares diminishes as length of haul increases. One possible outcome of the findings is to raise doubts regarding the ability of Southwest to successfully introduce its low-fare service in longer-haul markets. For example, it has been observed that longer-haul markets appear to more competitive than short-haul markets, which, in turn, might result in more competitive fares in longer-haul markets.

However, the 51.01 percent drop in weighted average fares in the 1992 New Markets is noteworthy because the weighted average length of haul is 687 miles in those 20 New
Markets. Except for the 1992 New Markets, the weighted average length of haul in all other yearly sets of New Markets ranged from 402 miles to 560 miles. The large decline in average fares in the 1992 New Markets, which include four long-haul markets, suggests there might be some opportunities for Southwest to extend its low-fare service to longer-haul markets.

A third noteworthy conclusion from the analysis of New Markets relates to prior studies, such as the Transportation Research Board (1991) and Nocella (1993), showing fares in long-haul markets have decreased while fares in short-haul markets have increased since deregulation. Indeed, the stratification analysis of fares in Non-Southwest Markets suggests fares in short-haul markets increased 35.26 percent between 1988 and 1993. By comparison, medium-haul fares in Non-Southwest Markets are estimated to have increased 18.62 percent and long-haul fares appear to have risen 25.61 percent between 1988 and 1993.

The findings of the analysis suggest there is an important exception to findings of higher and rising short-haul
fares, and the exception appears to occur in Southwest Markets. For example, the greatest disparity between average fares in Southwest Markets and Non-Southwest Markets occurs in short-haul markets, where Southwest’s fares average 38.49 percent of the fares in short-haul Non-Southwest Markets. Moreover, average fares in the 22 New Markets Southwest entered in 1993 dropped 27.95 percent in the year following Southwest’s entry. Significantly, ten of the 22 New Markets were short-haul markets. Therefore, it appears Southwest’s presence is correlated with lower fares, which, if true, might stem the post-deregulation trend of rising prices in short-haul markets.

**Summary of Southwest’s presence and market conduct:** The empirical analysis of market conduct seeks to answer two questions. First, is carrier conduct in Southwest Markets differ from conduct in comparable Non-Southwest Markets? Second, is Southwest’s entry as an effective competitor correlated with conduct in an airport-pair market?
In answer to the first question, the observed conduct in Southwest Markets is consistent with southwest’s reputation as a low-fare competitor. Average fares in Southwest Markets appear to be much lower than fares in comparable markets where Southwest is not an effective competitor. However, the fare disparity appears to decrease as length of haul increases.

In answer to the second question, the findings suggest the lower fares in Southwest Markets are related to Southwest’s entry. Southwest’s entry into a market appears to be correlated with significant and permanent reductions in the market’s weighted average one-way fare. Although not possible to test with the available data, the lower average market fares might be due to the combination of (i) lower fares introduced by Southwest and (ii) incumbent competitors offering more capacity at discounted prices.

The observed decreases in New Market fares differ substantially from the observed increases in fares in Non-Southwest Markets. The fare increases in Non-Southwest
Markets might be correlated with the increased market power of the incumbent carriers.

It is concluded The Southwest Effect relates to the following characteristics of market conduct:

1. Southwest’s presence as an effective competitor appears to be correlated with lower average one-way fares vis-à-vis comparable markets where Southwest is not an effective competitor;

2. The correlation between Southwest’s presence and lower average fares vis-à-vis Non-Southwest Markets appears to weaken as length of haul increases; and

3. Southwest’s entry into a New Market appears to be correlated with a significant and long-term decline in weighted average one-way fares.
Southwest's presence and market response

Market response is measured in two ways: (i) the average number of Origin and Destination passengers per day each way (O&D pdew); and (ii) the average market revenues per day each way (revenues pdew). The analysis seeks to answer two questions. First, are there differences in market response between Southwest Markets and Non-Southwest Markets? Second, is Southwest's entry correlated with market response?

The regression analysis estimates average O&D pdew in Southwest Markets is 346 greater than traffic volume in the top 3,000 airport-pairs that are neither Adjacent Markets nor Southwest Markets. However, the regression analysis also suggests the hypothesized correlation between market response and Southwest's presence appears to decrease as length of haul increased. In markets beyond 1,437 miles, average O&D pdew in Southwest Markets is estimated to be less than the average O&D pdew in comparable airport-pairs that are neither Adjacent Markets nor Southwest Markets. The findings of the market
response regression appear to be consistent with findings from the regression of market conduct.

For example, in the fare regression, the coefficient of the Southwest Market dummy variable is negative, but the Southwest Market*length of haul interaction term is positive. Therefore, the regression coefficients, both deemed to be significant, suggest the weighted average fares in Southwest Markets increase faster than weighted average fares in other airport-pairs as length of haul increase. Accordingly, it is logical to expect the lower fares in short-haul Southwest Markets should, in turn, result in higher O&D pdew in the Southwest Markets, ceteris paribus, and the market response regression appears to confirm the expectation.

Similarly, as the disparity in average fares between Southwest Markets and Non-Southwest Markets decreases as length of haul increases, longer-haul passengers have less fare incentive to choose Southwest over competing carriers whose fares appear to be more competitive relative to Southwest’s. Therefore, the difference in traffic volume between Southwest Markets and Non-Southwest Markets would
be expected to decrease as length of haul increases, and the regression results appear to support the hypothesized market response.

However, the regression of O&D pdew has a low adjusted $R^2$, and comparisons of average O&D pdew and average fares by market stratification seem to suggest a complex and often contradictory relationship. On the one hand, in short-haul markets where Southwest's fare advantage is greatest, average O&D pdew in all three stratifications of traffic density in Southwest Markets is greater than average O&D pdew in the comparable short-haul Non-Southwest Markets. On the other hand, the observed relationship between fares and O&D pdew does not appear to generalize to all market stratifications.

The hypothesized relationship between weighted average fare and market demand is observed in high-density short-haul markets. In that stratification, weighted average fares in Southwest Markets are 39.65 percent of fares in comparable Non-Southwest Markets, which represent the greatest disparity in fares, and O&D pdew in Southwest Markets is 156.06 percent of O&D pdew in Non-Southwest
Markets, which is the greatest difference in average market demand. In contrast, the hypothesized relationship between weighted average fares and market demand is not observed in some of the other stratifications.

For example, in the high-density medium-haul stratification, weighted average fares in Southwest Markets are 44.08 percent less than average fares in comparable Non-Southwest Markets, but the average O&D pdew in Southwest Markets is 26.02 percent less than the average O&D pdew in comparable Non-Southwest Markets. Similarly, in medium-density medium-haul markets, the average O&D pdew in Southwest Markets is nearly the same as the average O&D pdew in Non-Southwest Markets, even though average fares in the former are nearly 35 percent less than average fares in comparable Non-Southwest Markets.

Table 51 compares the disparities in fares and O&D pdew between Southwest Markets and Non-Southwest Markets.
Table 51  Fares and O&D pdew in Southwest vs. Non-Southwest Markets

<table>
<thead>
<tr>
<th>1993 Market Stratifications</th>
<th>Fares in Southwest Markets as a Percent of Fares in Non-Southwest Markets</th>
<th>Origin &amp; Destination Passengers pdew in Southwest Markets as a Percent of O&amp;D in Non-Southwest Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Southwest’s Fare Included</td>
<td>Southwest’s Fare Excluded</td>
</tr>
<tr>
<td>Short-haul</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>63.12%</td>
<td>98.02%</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>50.00%</td>
<td>71.59%</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>39.65%</td>
<td>55.55%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>38.49%</td>
<td>54.29%</td>
</tr>
<tr>
<td>Medium-haul</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>76.12%</td>
<td>90.68%</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>65.72%</td>
<td>77.18%</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>55.92%</td>
<td>60.66%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>61.51%</td>
<td>73.30%</td>
</tr>
<tr>
<td>Long-haul</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>84.08%</td>
<td>91.43%</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>82.84%</td>
<td>88.83%</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>75.25%</td>
<td>77.95%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>80.42%</td>
<td>85.71%</td>
</tr>
<tr>
<td>TOTALS</td>
<td>44.14%</td>
<td>56.00%</td>
</tr>
</tbody>
</table>

The results summarized in the preceding table suggest lower average fares in stratifications of Southwest Markets do not always correspond with higher average O&D pdew relative to Non-Southwest Markets. Southwest’s emphasis on short-haul operations possibly explains the apparent contradiction of lower average fares and lower average O&D in some medium-haul and long-haul
stratifications of Southwest Markets. Southwest might be offering lower fares but not be providing competitive schedules (e.g., equivalent levels of nonstop service) in medium-haul and long-haul markets.

For example, in 1993 the average stage length (i.e., length of the average nonstop flight) in Southwest's network was 376 miles, compared to 628 miles on Delta's domestic flights, 835 miles on United's domestic flights and 848 miles on American's domestic flights.*

Southwest's significantly shorter average stage length implies Southwest offers relatively less nonstop service in longer-haul markets. Consequently, Southwest passengers traveling in longer-haul markets probably are subject to more stops en route compared to passengers on other carriers because competing carriers appear to offer more direct flights in longer-haul markets.

It is logical to assume that when they have a choice, most passengers prefer nonstop flights, which generally are quicker than flights involving one or more stops en route.

* U.S. Department of Transportation T1 Data extracted from Form 41 CD-ROM prepared by Data Base Products, Inc.
Therefore, the combination of Southwest’s lower fares and Southwest’s frequent non-stop service could account for the large disparity in average O&D pdew between short-haul Southwest Markets and short-haul Non-Southwest Markets. By similar reasoning, in medium-haul and long-haul markets where Southwest’s competitors appear to offer a greater number of nonstop flights, Southwest’s fare advantage might be mitigated somewhat by the lack of competitive nonstop flights. Consequently, in the medium-haul and long-haul stratifications of Non-Southwest Markets with both higher fares and higher O&D pdew than comparable Southwest Markets, the incongruity might be attributable to the availability of more nonstop service by Southwest’s competitors.

Although comparisons of average O&D pdew in Southwest Markets vis-à-vis Non-Southwest Markets reveal some surprising incongruities, Southwest’s entry as an effective competitor appears to be correlated with higher levels of market demand. The analysis of changes in average O&D pdew in the New Markets suggests average O&D pdew had doubled by 1993 in the New Markets entered between 1989 and 1992. Only the 22 New Markets entered in
1993 had demand not doubled following Southwest’s entry. However, even in the 1993 New Markets, average O&D pdew had increased by nearly 65 percent following Southwest’s entry, and it is logical to conclude the increase might have been greater if a full year’s results from Southwest’s 1993 entry had been included due to, among other things, the time required for consumers to become aware of and act on Southwest’s presence in the New Market.

By comparison, average O&D pdew in Non-Southwest Markets increased only 6.60 percent between 1988 and 1993. Average O&D pdew in the medium-haul and long-haul stratifications of Non-Southwest Markets increased 16.67 percent and 9.71 percent, respectively, but decreased 9.66 percent in the short-haul stratification. By comparison, the O&D pdew in Southwest’s 1989 New Markets increased by 164.62 percent between 1988 and 1993, and the much higher growth in Southwest New Markets might be correlated with the introduction of low-fare service by Southwest.

In addition, the decrease in average O&D pdew in the short-haul stratification of Non-Southwest Markets might
also be related to the growing presence of Southwest in short-haul markets. Of the 107 New Markets in which Southwest became an effective competitor between 1989 and 1993, 32 were short-haul markets under 500 miles.

It must be noted the analyses of market response as measured by the average number of Origin and Destination passengers per day each way does present some problems. In the regression analysis of market response, signs are not consistent and the regression with O&D pdew as the dependent variable has an adjusted $R^2$ of only 0.138. In the stratification analyses, support for hypothesis 3.1 and 3.3 appears to be weak and contradictory. It is possible factors other than fares have a stronger influence on O&D pdew which might account for the poor performance of the O&D pdew variable to measure market response. For example, factors such as the populations of cities and the level of service could be overriding factors.

Moreover, as a measure of market response, the average number of Origin and Destination passengers per day each way appears to have limited value. On the one hand,
demand (i.e., response) is assumed to be related to price (i.e., conduct). On the other hand, the level of O&D demand also is assumed to be related to factors other than price, such as the level of service.

Moreover, while a market's average number of O&D passengers provides an initial indication of whether there is sufficient demand to support nonstop service, the number of passengers is important only if a carrier can generate sufficient revenues from the traffic to profitably serve the market. Therefore, the average revenues per day each way in a market probably is a better measure of market response.

Of course, market revenues are determined by the amount of market demand and the average fare. As a measure of market response, revenues also are a function of the elasticity of demand in the market. The introduction of lower fares into markets with elastic demand results in an increase in revenues, whereas lowering fares in relatively inelastic markets results in lower revenues. The correlation between Southwest's presence and market revenues depends on demand elasticity in the market.
The interaction of fare and demand elasticity and their combined impact on revenues appear to be evident in the results of the regression of market response. The regression estimates average revenues in Southwest Markets are $6,808.87 higher than average revenues in markets that are neither Adjacent Markets nor Southwest Markets.

However, the regression also estimates Southwest Markets generate $105.19 less revenue per O&D passenger ($47.73 versus $152.92) than airport-pairs that are neither Adjacent Markets nor Southwest Markets. The latter finding seems to be consistent with lower average fares in Southwest Markets, which would be expected to generate lower revenues per passenger.

The regression analysis estimates that revenues per day each way are higher in Southwest Markets vis-à-vis the top 3,000 markets that are neither Adjacent Markets nor Southwest Markets. However, the stratification analysis indicates average revenues in Southwest Markets generally are lower than revenues in comparable Non-Southwest Markets. The significance of the Southwest Market*O&D
pdew interaction term might explain the apparent contradiction in findings of the regression analysis and the stratification analysis.

Table 52 compares ratios of average fares, O&D pdew and revenues pdew in Southwest Markets versus Non-Southwest Markets.

<table>
<thead>
<tr>
<th>1993 Market Stratifications</th>
<th>Southwest Mkt Fares as % of Fares in Non-Southwest Mkts</th>
<th>Southwest Market O&amp;D as Percent of Non-Southwest Markets</th>
<th>Southwest Mkt Revenues as Percent of Non-Southwest Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>63.12%</td>
<td>106.77%</td>
<td>67.31%</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>50.00%</td>
<td>115.44%</td>
<td>57.72%</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>39.65%</td>
<td>156.06%</td>
<td>61.88%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>38.49%</td>
<td>371.10%</td>
<td>142.35%</td>
</tr>
<tr>
<td>Medium-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>76.12%</td>
<td>121.15%</td>
<td>92.18%</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>65.72%</td>
<td>97.31%</td>
<td>63.90%</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>55.92%</td>
<td>73.98%</td>
<td>41.36%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>61.51%</td>
<td>102.53%</td>
<td>63.11%</td>
</tr>
<tr>
<td>Long-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>84.08%</td>
<td>121.32%</td>
<td>102.15%</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>82.84%</td>
<td>99.27%</td>
<td>82.20%</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>75.25%</td>
<td>73.55%</td>
<td>55.35%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>80.42%</td>
<td>106.94%</td>
<td>86.07%</td>
</tr>
<tr>
<td>TOTALS</td>
<td>44.14%</td>
<td>200.10%</td>
<td>88.34%</td>
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</tbody>
</table>
Findings of the stratification analysis suggest that in short-haul markets where Southwest offers both low-fares and nonstop flights, market demand appears to be higher than in comparable Non-Southwest Markets. The stratification analysis also suggests the higher demand in short-haul Southwest Markets might not be enough to compensate for the lower average fares in Southwest Markets. Consequently, average market revenues in short-haul Southwest Markets appear to be lower than average revenues in comparable Non-Southwest Markets.

The results of the stratification analysis also suggest average revenues in medium-haul and long-haul Southwest Markets tend to be lower than in comparable Non-Southwest Markets. However, the factors accounting for lower average revenues in medium-haul and long-haul Southwest Markets are assumed to differ from the reasons cited for the lower revenues in short-haul Southwest Markets.

*Average revenues in Southwest Markets are less than average revenues in Non-Southwest Markets in all three traffic stratifications of short-haul markets. However, the short-haul average for Southwest Markets is greater than the short-haul average for Non-Southwest Markets apparently due to the inclusion of a higher proportion of higher revenue high-density markets in the computation of the average of all short-haul Southwest Markets. For a more complete discussion, please refer to the comment on findings for hypothesis 3.4 in Chapter Four.
Average revenues in medium-haul and long-haul Southwest Markets are lower than average revenues in comparable Non-Southwest Markets apparently because other carriers offer more competitive price and service. In particular, Southwest's fares have been observed to approach competitors' fares as length of haul increases, and it has been noted competitors might be offering more nonstop service than Southwest in longer-haul markets. Consequently, the combination of a shrinking fare disparity between Southwest Markets and Non-Southwest Markets, and more nonstop service in Non-Southwest Markets could account for the generally lower market demand and lower market revenues in the medium-haul and long-haul stratifications of Southwest Markets.

Although Southwest Markets are observed to have generally lower revenues than Non-Southwest Markets, Southwest's entry into an airport-pair as an effective competitor appears to be associated with higher revenues. In the 31 New Markets Southwest entered in 1989, average revenues in 1993 were 79.59 percent greater than the average revenues in the same markets in 1988, the year prior to Southwest's entry. By comparison, average revenues in Non-Southwest
Markets increased by 36.65 percent between 1988 and 1993, less than one-half the growth observed in Southwest’s New Markets.

Table 53 summarizes the changes in fares, O&D pdew and revenues pdew in Southwest’s New Markets.

<table>
<thead>
<tr>
<th>Southwest’s Year of Entry</th>
<th>Number of New Markets</th>
<th>Percent Change, Prior to Entry to 1993</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Average Fare</td>
</tr>
<tr>
<td>1989</td>
<td>31</td>
<td>-32.38%</td>
</tr>
<tr>
<td>1990</td>
<td>19</td>
<td>-37.23%</td>
</tr>
<tr>
<td>1991</td>
<td>15</td>
<td>-44.85%</td>
</tr>
<tr>
<td>1992</td>
<td>20</td>
<td>-51.01%</td>
</tr>
<tr>
<td>1993</td>
<td>22</td>
<td>-27.95%</td>
</tr>
<tr>
<td>AVERAGES</td>
<td>21.4</td>
<td>-43.14%</td>
</tr>
</tbody>
</table>

The findings in the preceding table appear to suggest the presence of elastic demand in Southwest Markets, which would be consistent with Southwest’s reputation for careful market analysis (i.e., Southwest only enters markets where it can stimulate sufficient demand to increase market revenues). Additional evidence suggesting elastic demand in Southwest’s New Markets is observed in
the inverse movement of fares and revenues which appear to be correlated with Southwest's entry.

For example, overall average fares in New Markets decreased 43.14 percent (23.68 percent if Southwest's fares are not included). Despite the drop in the weighted average fares in Southwest's New Markets, overall average market revenues in Southwest's New Markets increased by 46.67 percent between the year prior to Southwest's entry and 1993. The revenue growth in New Markets appears to be the net result of significantly lower fares and significantly higher demand after Southwest enters, which suggests elastic demand in Southwest's New Markets.

The hypothesized elastic response is especially noteworthy in the 1989 New Markets. Fares in the 31 New Markets Southwest entered in 1989 were 32.38 percent lower in 1993 than in 1989, demand in the 31 New Markets increased 164.62 percent, and average revenues increased 79.59 percent between 1988 (i.e., the year prior to Southwest's entry) and 1993. The behavior of weighted average fares, market demand and market revenues in Southwest's New Markets appears to contrast sharply with the behavior of
the same variables over the same time period in Non-
Southwest Markets.

By comparison, average market revenues in Non-Southwest
Markets also increased between 1988 and 1993, but the
increase appears to be due to increases in both weighted
average fares and average O&D pdew, which suggests
inelastic demand. Between 1988 and 1993, the weighted
average one-way fare in all Non-Southwest Markets
increased 26.45 percent, the average O&D pdew increased
6.70 percent, and the average revenues per day each way
increased 34.94 percent. The results suggest demand in
Non-Southwest Markets appears to be inelastic.

The conclusion of elastic demand in Southwest’s New
Markets appears to be consistent with an assumption the
New Markets were entered because they represented
lucrative opportunities for Southwest’s service. If,
prior to entry, Southwest’s analysis of the New Markets
had revealed latent demand not realized by incumbent
carriers due to high fares and/or poor service,
Southwest’s entry would be expected to result in a
significant increase in both O&D pdew and market
revenues.* Therefore, even though Southwest Markets are observed to generally have lower average revenues than comparable Non-Southwest Markets, Southwest's entry into a New Market appears to stimulate revenues in the market.

Summary of Southwest's presence and market response: The analyses of market response seek to answer two questions. First, are there differences in market response between Southwest Markets and Non-Southwest Markets? Second, is Southwest's entry correlated with market response?

In answer to the first question, the regression analyses estimate Southwest Markets have 346 more Origin and Destination passengers per day each and $6,808.87 higher revenues per day each way than the top 3,000 airport-pairs that are neither Adjacent Markets nor Southwest Markets. However, the significance of interaction terms involving Southwest Markets suggests the hypothesized relationships between Southwest's presence and market response are not uniform across markets. Indeed, when length of haul and

* See Chapter Three for a discussion of endogeneity.
traffic density are considered, as is done in the stratification analyses, the findings suggest somewhat different conclusions.

The stratification analyses also suggest the average O&D pdew in Southwest Markets generally tends to be higher than the average O&D pdew in comparable Non-Southwest Markets. On the other hand, the stratification analyses suggest the average revenues per day each way in Southwest Markets tend to be less than the average revenues pdew in comparable Non-Southwest Markets. Differences in the amount of nonstop service in medium-haul and long-haul markets were mentioned as factors possibly contributing to the disparities between Southwest Markets and Non-Southwest Markets.

In answer to the second question regarding the relationship between Southwest’s entry and market response, the analyses of Southwest’s New Markets indicate Southwest’s entry into an airport-pair appears to be correlated with significant growth in both demand and revenues. Moreover, the observed growth in Southwest’s New Markets appears to be greater than the observed growth
in Non-Southwest Markets over the same time period. In addition, the gain in market revenues in Southwest’s New Markets, which appears to be correlated with the introduction of Southwest’s low-fare service, also appears to suggest demand in Southwest Markets is elastic. By comparison, the stratification analyses seems to suggest demand in Non-Southwest Markets is inelastic.

Therefore, it is concluded The Southwest Effect relates to the following characteristics of market response:

1. Southwest’s presence as an effective competitor appears to be correlated with higher average O&D pdew and lower average revenues pdew than comparable markets where Southwest is not an effective competitor;

2. The correlation between Southwest’s presence as an effective competitor and market response appears to change as length of haul changes; and

3. Southwest’s entry into a New Market appears to be correlated with a significant stimulation of both O&D pdew and market revenues pdew.
Market conduct in Adjacent Markets

The study seeks to answer two questions regarding conduct in Adjacent Markets. First, do carriers in Adjacent Markets exhibit conduct that is different from either Southwest Markets or Non-Southwest Markets? Second, does a change occur in the conduct of carriers in Adjacent Markets after Southwest's entry in an adjacent airport-pair?

Anecdotal evidence, such as "16,000 people [in Memphis, an airport not served by Southwest] paid $24 in 1992 to ride a bus to [an] airport that Southwest serves 145 miles away"\textsuperscript{25}, suggests The Southwest Effect might extend to airport-pairs Southwest does not serve. The study hypothesizes the loss of passengers to a nearby Southwest Airport forces carriers at the Adjacent Airports to lower their fares just enough so that consumers cannot justify the cost and inconvenience of driving to a Southwest Airport.
If the Southwest Effect extends to Adjacent Markets, it is hypothesized fares in the Adjacent Markets will be higher than fares in Corresponding Southwest Markets, but less than fares in comparable Non-Southwest Markets. Moreover, the hypothesized lower fares in Adjacent Markets should, in turn, be related to the following: (i) an increase in O&D pdeW in Adjacent Markets; and (ii) depending on the elasticity of demand in Adjacent Markets, a change in revenues in Adjacent Markets.

An Adjacent Market is defined as an airport-pair in which Southwest serves one, but not both airports, and the airport not served by Southwest is located within 150 miles of another Southwest Airport. Appendix A lists the Southwest Airports and the Adjacent Airports.

The comparisons of Adjacent Markets with Corresponding Southwest Markets and with Non-Southwest Markets are designed to determine whether the Southwest Effect extends to other markets, and, if so, the degree of the effect.

* A Corresponding Southwest Market is defined as an airport-pair which meets both of the following conditions: (i) Southwest served both airports at yearend 1993 and (ii) there was a corresponding Adjacent Market.
However, neither the regression analyses nor the stratification analyses suggest a correlation exists between Southwest's presence in a nearby airport-pair and conduct in Adjacent Markets.

In the regression analysis of market conduct, in which the weighted average one-way fare is the dependent variable, the dummy variable for Adjacent Markets is deemed not to be significant ($p$-value of 0.99). A plausible explanation for the failure of the regression analysis to establish a statistical correlation might be the definition used for Corresponding Southwest Markets. There is no minimum market share requirement in the definition of Corresponding Southwest Markets. Southwest need only serve both airports at yearend for the Adjacent Market to be included in the analysis. Consequently, in the Corresponding Southwest Markets where Southwest’s market share is relatively small, it is possible Southwest’s presence has little, if any, correlation with conduct in the respective Adjacent Markets. However, a regression analysis of market conduct in which the definition of Adjacent Markets is modified to require Southwest to have at least a 10.00 percent market share of revenues in the
Corresponding Southwest Markets does not appear to change the outcome — the coefficient of the Adjacent Market dummy variable again is insignificant.

The stratification analysis suggests fares in Adjacent Markets appear to be higher than average fares in comparable Southwest Markets, as hypothesized. However, average fares in Adjacent Markets also appear to be higher than average fares in most stratifications of comparable Non-Southwest Markets, which is an unexpected finding.

There is one exception to the finding of generally higher fares in Adjacent Markets vis-à-vis Non-Southwest Markets. In high-density short-haul markets*, average fares in Adjacent Markets are 24.23 percent less than average fares in comparable Non-Southwest Markets. The finding that the only stratification in which fares in Adjacent Markets are substantially less than fares in Non-Southwest Markets is a short-haul stratification is surprising for two reasons.

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* The same market stratification which exhibited the greatest difference between fares in Southwest Markets and Non-Southwest Markets. No explanation has been devised to account for what appears to be a rather significant coincidence.
First, it has been hypothesized there is a significant difference in fares between Adjacent Markets and Non-Southwest Markets, but significantly lower fares are evident in only one stratification of Adjacent Markets. Secondly, in a short-haul market, it is logical to assume passengers have less incentive to invest the time to drive to another airport to take advantage of lower fares on a flight of relatively short duration. If the fare in a short-haul Adjacent Market is deemed too high, it seems more likely a passenger would either not go or choose another mode, rather than drive to an out-of-the-way Southwest Airport to take a short-haul flight.

Except in the high-density short-haul stratification, fares in Adjacent Markets appear not exhibit the hypothesized pattern. Moreover, in airport-pairs adjacent to Southwest's New Markets, average fares generally do not exhibit the hypothesized decline following Southwest's entry. It has been hypothesized average fares in Adjacent Markets would decrease after Southwest becomes an effective competitor in a nearby airport-pair. However, changes in weighted average fares in new Adjacent Markets were inconsistent, and did not appear to exhibit any of
the strong downward trends observed in Southwest’s New Markets.

The apparent absence of a correlation between Southwest’s presence and fares in Adjacent Markets could be due to a lack of consumer awareness of Southwest’s presence. Passengers using Adjacent Airports in cities not served by Southwest (e.g., Pittsburgh) may not be aware of, and therefore unable to take advantage of, the lower fares at the nearby Southwest Airports. For example, it is logical to conclude that in large metropolitan areas served by more than one commercial service airport, such as Chicago, Dallas or Washington-Baltimore, Southwest’s advertising message is received by travelers using the Adjacent Airports in the same metropolitan areas. For example, passengers using Chicago O’Hare (i.e., an Adjacent Airport) probably have a high likelihood of having been exposed to advertisements of Southwest’s Chicago Midway services. However, it is not known if Southwest advertises its Birmingham service in Atlanta or its Cleveland flights in Pittsburgh.*

* Southwest began its first nationwide advertising campaign in the fall of 1995 when it became a sponsor of ABC’s Monday Night Football.
If passengers living in cities served by Southwest are better informed of their choices of carriers and airports than passengers living in Adjacent Airport cities not served by Southwest, then the absence of the hypothesized differences in fares between Adjacent Markets and Non-Southwest Markets is not surprising. Because they are less aware of Southwest’s low-fare service, passengers in Adjacent Airport cities would not be as likely to react to Southwest’s entry at an out-of-town airport, and competing carriers at the Adjacent Airports would have less incentive to change their conduct following Southwest’s entry. Therefore, fares in Adjacent Markets would not be expected to differ significantly from fares in comparable Non-Southwest Markets.

Failure of the stratification analysis to reveal hypothesized differences in fares might also be due to the diminishing relationship between The Southwest Effect and length of haul. For example, in short-haul markets, fares in Southwest Markets are lower, but passengers from Adjacent Airport cities might not be able to justify the time investment to drive to a Southwest Airport to take a
relatively brief short-haul flight. In short-haul markets, fare savings might be substantial at the Southwest Airport, but consumers would be spending more time in their cars than in the airplane, thereby mitigating the time benefits of air travel. In longer-haul markets, where longer ground times relative to air time become more justifiable, the Southwest fare advantage is much less. Therefore, it is reasonable to conclude, airlines in Adjacent Markets have not lowered their fares by substantial amounts because enough consumers have not been willing to trade off dollar savings for higher travel times by driving to Southwest Airports.

Although the evidence does not support the hypothesized relationship of fares in Adjacent Markets vis-à-vis Non-Southwest Markets, it does appear fares in new Adjacent Markets might be correlated with Southwest's entry. Between 1988 and 1993, the weighted average one-way fare in all Non-Southwest Markets increased by 29.62 percent. By comparison, fares in the four new Adjacent Markets created in 1989 increased 12.21 percent between 1988 (i.e., the year prior to Southwest’s entry in the adjacent airport-pair) and 1993. The observed increase in fares in
the four new Adjacent Markets is just 41.22 percent of the observed increased in fares in Non-Southwest Markets over the same time period.

Overall, average fares in the 64 new Adjacent Markets decreased 0.28 percent between the years prior to entry and 1993. Therefore, it appears if there is a correlation between Southwest's entry and conduct in Adjacent Markets, the related conduct appears to be little or no incremental increase in average fares by competing carriers in the Adjacent Markets vis-à-vis the price hikes by carriers in Non-Southwest Markets. By not raising fares in Adjacent Markets as much as fares have been raised in Non-Southwest Markets, incumbent carriers in the Adjacent Markets might have been able to minimize the diversion of traffic to nearby Southwest Markets.

**Summary of conduct in Adjacent Markets:** The study seeks to answer two questions regarding conduct in Adjacent Markets. First, do carriers in Adjacent Markets exhibit conduct that is different from either Southwest Markets or Non-Southwest Markets? Second, does a change occur in the
conduct of carriers in Adjacent Markets after Southwest's entry in an adjacent airport-pair?

In answer to the first question, the regression analysis suggests fares in Adjacent Markets are not statistically different from fares in other markets that are not Southwest Markets. The dummy variable for Adjacent Markets is not statistically significant. In particular, the regression results do not support a hypothesized correlation of lower fares in Adjacent Markets.

On the other hand, the stratification analyses does appear to suggest that conduct in Adjacent Markets differs from conduct in either Southwest Markets or Non-Southwest Markets. As hypothesized, fares in Adjacent Markets appear to be higher than fares in comparable Southwest Markets. However, the observed conduct in Adjacent Markets vis-à-vis Non-Southwest Markets appears to be the opposite of the hypothesized relationship. Fares in Adjacent Markets appear to be higher than fares in most stratifications of comparable Non-Southwest Markets.
In answer to the second question, the findings of the stratification analysis do not appear to support the hypothesized changes in Adjacent Market fares. Fares in new Adjacent Markets do not appear to exhibit the hypothesized decreases which had been observed in fares in Southwest's New Markets. At best, fares in new Adjacent Markets might not have risen as much as fares in Non-Southwest Markets.

It appears anecdotal evidence* of a correlation between Southwest's presence and lower average one-way fares in Adjacent Markets vis-à-vis Non-Southwest Markets, might be relatively isolated and does not generalize. Two explanations for the absence of a material impact are offered. First, it is possible the cost savings in Southwest Markets are not sufficient to justify the time required to drive to a Southwest Airport, especially in short-haul markets. Second, it is possible potential customers in Adjacent Markets are not aware of Southwest's low fares at a nearby airport, and the correlation only exists in same-city Adjacent Markets. Indeed, the

* See discussion of The Southwest Effect in Chapter Two and discussion following Table 5 in Chapter Three.
findings of lower fares in markets adjacent to People Express' airport-pairs reported by Whinston and Collins (1992) pertained only to Adjacent Markets in the same cities.

If Southwest's presence is correlated with fares in Adjacent Markets, and the regression analysis and stratification analysis suggest different conclusions, the relationship appears to be Southwest's presence results in higher, not lower, fares in Adjacent Markets. Moreover, there is not enough evidence to suggest Southwest's entry as an effective competitor in a nearby airport-pair is correlated with a reduction in fares in the new Adjacent Markets, and the anecdotal evidence to the contrary appears to be the exception rather than the rule.

Therefore, it is concluded The Southwest Effect, if it is related to conduct in Adjacent Markets, is related in ways not yet fully understood.
Market response in Adjacent Markets

Adjacent Markets are examined to answer two questions regarding market response in airport-pairs not served by Southwest. First, does market response in Adjacent Markets differ from market response in either Southwest Markets or Non-Southwest Markets? Second, does a change occur in market response in Adjacent Markets after Southwest’s entry in an airport-pair? Market response is measured by the average number of Origin and Destination passengers per day each way (O&I pdew) and by the average market revenues per day each way (revenues pdew).

The hypothesized correlation between Southwest’s presence in an airport-pair and market response in Adjacent Markets is an increase in both traffic volume and market revenues. The regression analyses suggest Southwest’s presence is not related to conduct in Adjacent Markets. The dummy variable for Adjacent Markets is deemed not statistically significant in either regression of market response (p-values of 0.62 and 0.12). However, the stratification analyses do appear to provide some evidence to support the
hypothesized relationships between Southwest's presence and market response in Adjacent Markets.

The average number of O&D pdew in Adjacent Markets is hypothesized to be less than the average number of O&D pdew in the Corresponding Southwest Markets for two reasons. First, fares in the Corresponding Southwest Markets are hypothesized to be lower than fares in Adjacent Markets, thereby stimulating more local traffic in the Corresponding Southwest Markets. Second, price sensitive passengers in Adjacent Airport cities not served by Southwest are hypothesized to be driving to the nearby Southwest Airports to take advantage of the lower fares, thereby diverting some traffic from Adjacent Markets to the Corresponding Southwest Markets.

The stratification analyses suggest the average O&D pdew in most stratifications of Corresponding Southwest Markets appears to be significantly higher than the average O&D pdew in the respective Adjacent Markets. As noted, the higher traffic in Southwest Markets might possibly reflect the combination of lower fares stimulating local travel demand in the Corresponding Southwest Markets, and the
diversion of passengers from Adjacent Airports to take advantage of the lower fares at Southwest Airports. However, two market stratifications appear to have the incongruous observations of both lower fares and lower O&D pdey in Corresponding Southwest Markets.

The two stratifications with the incongruous results are high-density medium-haul and high-density long-haul markets. Neither exception involves a short-haul stratification, and it is possible competitors in the Adjacent Markets are able to overcome Southwest's fare advantage by offering more nonstop service. As a result, fares and traffic demand in the Adjacent Markets are higher than in the comparable Corresponding Southwest Markets.

Although the stratification results generally support the hypothesized differences between Adjacent Markets and Southwest Markets, the stratification analysis does not support the hypothesized differences in O&D pdey between Adjacent Markets and Non-Southwest Markets. The average number of O&D pdey in most stratifications of Adjacent Markets is either less than or nearly the same as the
average number of O&D pdew in comparable Non-Southwest Markets. Moreover, differences in the average number of O&D pdew frequently are not consistent with observed differences in average fares between Adjacent Markets and Non-Southwest Markets.

For example, in high-density short-haul markets, average O&D pdew in Non-Southwest Markets is 4.79 percent greater than average O&D pdew in comparable Adjacent Markets even though average fares in Non-Southwest Markets are 31.98 percent greater than comparable Adjacent Markets. In five of the nine market stratifications, and overall, differences in average fares and average O&D pdew between Adjacent Markets and Non-Southwest Markets appear to exhibit the same logical inconsistency. The apparent incongruities between fares and O&D pdew might be due, in part, to differences in the levels of service.

There are other apparent complications to the analysis of response in Adjacent Markets. For example, the anecdotal evidence discussed in Chapter One seems to indicate passengers are traveling to Southwest Airports to take advantage of lower fares, which implies demand in the
Adjacent Markets should decline. On the other hand, fares in Adjacent Markets appear to have not increased as much as fares in Non-Southwest Markets, which might suggest demand in Adjacent Markets could have been stimulated slightly by the relative stability of fares. Furthermore, carriers in Adjacent Markets might have responded to Southwest's entry at a nearby airport by increasing the level of nonstop service in the Adjacent Markets, thereby stimulating demand to make up for the loss of price sensitive passengers to the Southwest Airport.

Accordingly, the number of O&D pde in an Adjacent Market might be correlated with two separate developments related to Southwest's presence: (i) some O&D pde might be diverted to a nearby Southwest Airport, thereby reducing O&D pde in the Adjacent Market; and (ii) some O&D pde might be stimulated by relatively stable fares and/or additional nonstop service at the Adjacent Airport, thereby increasing O&D pde in the Adjacent Market. For example, Table 5 showed Southwest's entry in the Baltimore-Chicago Midway airport-pair appeared to be correlated with much lower fares and much higher O&D pde
in three Adjacent Markets: Baltimore-Chicago O'Hare, Washington National-Chicago Midway, and Washington Dulles-Chicago Midway. In contrast, Ott (1994)\textsuperscript{126} reported the Adjacent Markets of Washington Dulles-Cleveland and Washington National-Cleveland also experienced lower fares, but the Adjacent Markets had lower O&D premium after Southwest entered service in the Cleveland-Baltimore market.

If there is some diversion of traffic from Adjacent Airports to Southwest Airports, and if incumbent carriers at the Adjacent Airports then respond either by holding the line on fares or by offering more direct service, the net impact on traffic volume in the Adjacent Markets might have been zero. Such a conclusion could account for the anecdotal evidence of traffic diversion, the absence of a strong correlation between Southwest's presence and conduct in Adjacent Markets, and the apparent inconsistencies in fare and traffic results between Adjacent Markets and Non-Southwest Markets.

In addition, the apparent absence of the hypothesized correlation between Southwest's presence and response in
Adjacent Markets could be due to a lack of consumer awareness of Southwest's presence. It was noted earlier in the chapter passengers using Adjacent Airports in cities not served by Southwest may not be aware of, and therefore unable take advantage of, the lower fares at the nearby Southwest Airports. A conclusion that conduct in Adjacent Markets might depend on whether the Adjacent Airport is in the same city as the Southwest Airport is consistent with the anecdotal evidence presented in Table 5 and with the findings of Whinston and Collins (1992).

Another plausible explanation for why the average O&D pdew in Adjacent Markets appears to not exhibit the hypothesized premium to O&D pdew in Non-Southwest Markets might be related to the methodology used to define Adjacent Markets. An Adjacent Market is defined as an airport-pair consisting of the following: (i) one airport served by Southwest at yearend 1993; and (ii) a second airport that is: (a) not served by Southwest; (b) ranked among the top 100 airports in the continental U.S. based on enplanements; and (c) located within 150 air miles of another Southwest Airport. The very broad definition of Adjacent Markets might result in the inclusion of some
airport-pairs as Adjacent Markets where, a priori, it is unlikely there would be a significant correlation between Southwest’s presence in a nearby market and response in the Adjacent Market.

For example, there is no minimum market share requirement in the definition of Corresponding Southwest Markets. In the Corresponding Southwest Markets where Southwest’s share is relatively small, it is possible Southwest’s presence has little, if any, correlation with O&D pdez in the respective Adjacent Markets. However, a regression analysis of market response in which the definition of Adjacent Markets is modified to require Southwest have at least a 10.00 percent market share of revenues in the Corresponding Southwest Markets does not appear to change the outcome — the coefficient of the Adjacent Market dummy variable again is insignificant.

Yet another explanation for the failure of Adjacent Markets to exhibit the hypothesized correlation between O&D pdez and Southwest’s presence could be due to the inclusion of airport-pairs that are not practical Adjacent
Markets. For example, the airport-pair of Dayton-Detroit is classified as an Adjacent Market with the Corresponding Southwest Market of Indianapolis-Detroit. However, it seems unlikely Southwest’s presence in the Indianapolis-Detroit market, which has a length of haul of 168 miles would have a significant correlation with market response in the Dayton-Detroit market because Dayton passengers would have to drive about 115 miles to the Adjacent Airport in Indianapolis, which would increase total travel time significantly.

Not only is the analysis of Adjacent Markets complicated by driving distance relative to stage length, the analysis also overlooks the importance of service levels. Although the Dayton-Detroit might have a higher fare than Indianapolis-Detroit because Dayton is not served by Southwest, the Dayton-Detroit market might have sufficient nonstop flights to partially offset any fare advantage which might exist in the Indianapolis-Detroit airport-pair.

While the comparison of average O&D pdew in Adjacent Markets versus Non-Southwest Markets does not suggest a
strong correlation between Southwest's presence and market response, the analysis of new Adjacent Markets appears to offer some support for the anecdotal evidence of traffic diversion from the new Adjacent Markets to Southwest Markets. When the 1993 averages of O&D pdew in the annual sets of new Adjacent Markets are compared to each set's average O&D pdew in the years prior to Southwest's entry, the average number of O&D pdew dropped significantly in all but one of the annual sets of new Adjacent Markets.*

The large decreases in the average O&D pdew in most annual sets of new Adjacent Markets between the years prior to Southwest's entry and 1993 are significant because there appears to be no similar consistent pattern to the changes in fares in new Adjacent Markets. The drop in O&D pdew apparently cannot be attributable entirely to changes in fares, because fares in the new Adjacent Markets exhibited

* The slight increase in average O&D pdew in the 22 new Adjacent Markets in 1993 contrasts sharply with the large decreases in average O&D pdew in the other sets of new Adjacent Markets. The disparity could be due to the lack of a full year's data from Southwest's entry in the Corresponding Southwest Markets and the time required for consumers in the new Adjacent Markets to learn of, and respond to, Southwest's presence at the nearby airports.
very little change. In addition, the magnitude of the decreases in average O&D pdew in the new Adjacent Markets appears to be in contrast with the increases in the average O&D pdew observed in Non-Southwest Markets. Since the observed decreases in average O&D pdew in the annual sets of new Adjacent Markets appear not to be associated with either higher prices or a general industry trend, the findings suggest Southwest’s entry in nearby markets might be correlated with the drop in the average O&D pdew in some of the new Adjacent Markets.

Except for the analysis of new Adjacent Markets, comparing market response in Adjacent Markets versus Non-Southwest Markets with the O&D pdew measure provided some contradictory findings. Similarly, the market response analysis with the revenues pdew measure also appears to yield some inconsistent results.

For example, when stratifications of Adjacent Markets are compared to Non-Southwest Markets, average revenues pdew appear to be higher in some, but not all, stratifications of Adjacent Markets. However, the stratification analysis of average revenues pdew in Adjacent Markets vis-à-vis
Southwest Markets appears to yield somewhat contradictory findings. Moreover, in short-haul and low-density markets, average revenues in Southwest Markets are greater than in comparable Adjacent Markets, but in longer-haul and higher-density markets, average revenues in Southwest Markets are lower. The findings appear to be consistent with Southwest's focus on short-haul operations. It is possible competing carriers offer better service in longer-haul Adjacent Markets, which might account for the higher revenues in those stratifications.

Given that fares in most annual sets of new Adjacent Markets appear to have not changed much between the years prior to Southwest's entry and 1993, and given that the average O&D pdew in most annual sets of new Adjacent Markets appears to have decreased significantly over the same period, it is not surprising the average revenues pdew in most annual sets of new Adjacent Markets appear to have fallen substantially between the year prior to Southwest's entry and 1993.
The revenue decreases in the new Adjacent Markets appear to contrast sharply with the revenue increases in Non-Southwest Markets between 1988 and 1993. Based on the observations that (i) average revenues pdew in Adjacent Markets appear to be lower than average revenues pdew in most stratifications of Non-Southwest Markets; (ii) average revenues pdew in new Adjacent Markets appear to have fallen over the time period of Southwest’s presence; and (iii) average revenues pdew in Non-Southwest Markets appear to have increased over the time period, the evidence suggests Southwest’s entry in a nearby airport-pair might be correlated with changes in revenues pdew in new Adjacent Markets.

Table 54 summarizes the changes in average fares, O&D pdew and average revenues pdew in the new Adjacent Markets between the years prior to Southwest’s entry and 1993.
Table 54  Conduct and Response Changes In New Adjacent Markets

<table>
<thead>
<tr>
<th>Southwest’s Year of Entry</th>
<th>Number of New Adjacent Mkts.</th>
<th>Percent Change, Prior to Entry to 1993</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average Fare</td>
<td>O&amp;D pdew</td>
</tr>
<tr>
<td>1989</td>
<td>12.21%</td>
<td>- 44.43%</td>
</tr>
<tr>
<td>1990</td>
<td>6.31%</td>
<td>- 52.01%</td>
</tr>
<tr>
<td>1991</td>
<td>- 28.20%</td>
<td>- 30.77%</td>
</tr>
<tr>
<td>1992</td>
<td>- 0.34%</td>
<td>- 23.46%</td>
</tr>
<tr>
<td>1993</td>
<td>0.15%</td>
<td>9.68%</td>
</tr>
<tr>
<td>AVERAGES</td>
<td>12.8</td>
<td>- 0.28%</td>
</tr>
<tr>
<td></td>
<td>- 20.25%</td>
<td></td>
</tr>
</tbody>
</table>

The findings in the Table 54 suggest Southwest’s entry as an effective competitor in a nearby airport-pair appears to be correlated with the following events in Adjacent Markets: (i) an apparent decline in the average number of O&D pdew; and (ii) an apparent decline in the average market revenues pdew. The hypothesized correlation might be due to the diversion of Origin and Destination traffic from the Adjacent Airports to the Southwest Airports.

Table 55 compares average fares, average O&D pdew and average revenues pdew in Adjacent Markets versus their Corresponding Southwest Markets.
Table 55  Conduct and Response in Corres. Southwest vs. Adj. Mkts

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Short-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>41.74%</td>
<td>662.83%</td>
<td>276.74%</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>43.09%</td>
<td>395.36%</td>
<td>141.79%</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>57.62%</td>
<td>190.57%</td>
<td>109.81%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>54.74%</td>
<td>255.44%</td>
<td>132.92%</td>
</tr>
<tr>
<td>Medium-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>60.00%</td>
<td>360.00%</td>
<td>216.26%</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>66.01%</td>
<td>114.94%</td>
<td>75.90%</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>70.34%</td>
<td>36.26%</td>
<td>25.50%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>66.27%</td>
<td>117.99%</td>
<td>78.14%</td>
</tr>
<tr>
<td>Long-haul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
<td>84.56%</td>
<td>323.79%</td>
<td>273.58%</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
<td>86.37%</td>
<td>127.17%</td>
<td>109.80%</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
<td>84.01%</td>
<td>33.59%</td>
<td>28.21%</td>
</tr>
<tr>
<td>Sub-totals</td>
<td>82.95%</td>
<td>95.25%</td>
<td>78.99%</td>
</tr>
<tr>
<td>TOTALS</td>
<td>59.10%</td>
<td>154.16%</td>
<td>89.70%</td>
</tr>
</tbody>
</table>

The results in Table 55 appear to suggest the following relationships regarding market response: (i) the average number of Origin and Destination passengers per day each way in most stratifications of Corresponding Southwest Markets appears to be higher than in the respective Adjacent Markets; and (ii) the average market revenues per day each way in most stratifications of Corresponding
Southwest Markets appear to be higher than in the respective Adjacent Markets.

Table 56 compares average fares, average O&D pdew and average revenues pdew in Adjacent Markets versus Non-Southwest Markets.

<table>
<thead>
<tr>
<th>Table 56 Conduct and Response in Non-Southwest, Rev. vs. Adj. Mkts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993 Market Stratifications</td>
</tr>
<tr>
<td>-----------------------------</td>
</tr>
<tr>
<td><strong>Short-haul</strong></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
</tr>
<tr>
<td>Sub-totals</td>
</tr>
<tr>
<td><strong>Medium-haul</strong></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
</tr>
<tr>
<td>Sub-totals</td>
</tr>
<tr>
<td><strong>Long-haul</strong></td>
</tr>
<tr>
<td>1-50 O&amp;D</td>
</tr>
<tr>
<td>51-150 O&amp;D</td>
</tr>
<tr>
<td>Over 150 O&amp;D</td>
</tr>
<tr>
<td>Sub-totals</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
</tr>
</tbody>
</table>

The definition of Non-Southwest Markets has been revised to include airport-pairs with lengths of haul longer than the longest-haul Southwest Market but less than the longest-haul Adjacent Market.
The findings in Table 56 suggest the following relationships regarding market response in Adjacent Markets: (i) in most short-haul and medium-haul stratifications of Adjacent Markets, the average number of O&D pdew in Adjacent Markets appears to be less than the average O&D pdew in comparable stratifications of Non-Southwest Markets; (ii) in long-haul stratifications of Adjacent Markets, the average number of O&D pdew appears to be higher than in comparable long-haul Non-Southwest Markets; and (iii) the average market revenues per day each way appear to be higher in most stratifications of Adjacent Markets than in comparable Non-Southwest Markets.
Summary of response in Adjacent Markets: Adjacent Markets were examined to answer two questions regarding market response in airport-pairs not served by Southwest. First, does market response in Adjacent Markets differ from market response in either Southwest Markets or Non-Southwest Markets? Second, does a change occur in market response in Adjacent Markets after Southwest's entry in an airport-pair?

In answer to the first question, response in Adjacent Markets appears to differ from response in either Southwest Markets or Non-Southwest Markets, although the results are not uniformly consistent. For example, as hypothesized, the analyses show that the average number of O&D pdew in most stratifications of Corresponding Southwest Markets is significantly higher than in the respective Adjacent Markets. On the other hand, the stratification analysis does not support the hypothesized differences in O&D pdew between Adjacent Markets and Non-Southwest Markets. Differences are observed, but the number of O&D pdew in most stratifications of Adjacent Markets is either less than or nearly the same as in comparable Non-Southwest Markets. Adjacent Markets had
been hypothesized to exhibit higher levels of demand than comparable Non-Southwest Markets.

Market response also has been measured by average revenues per day each way, and findings from the analysis of market response with this measure are inconsistent as well. In short-haul and low-density markets, average revenues per day in Southwest Markets are greater than in comparable Adjacent Markets, but in longer-haul and higher-density markets, average revenues per day in Southwest Markets are lower. As hypothesized, most stratifications of Adjacent Markets have higher average revenues than comparable stratifications of Non-Southwest Markets.

The inclusion in the analyses of some Adjacent Markets, that a priori, probably would not have been correlated with Southwest's presence, such as markets adjacent to Corresponding Southwest Markets with low Southwest shares and short-haul markets where driving distances are relatively long, might have obscured evidence of a relationship between Southwest's presence and market response in Adjacent Markets. In addition, differences in
service levels could have accounted for some of the inconsistencies.

In answer to the second question, the analyses of new Adjacent Markets suggest the possibility Southwest's entry as an effective competitor might be related to lower O&D pdew and lower market revenues pdew in the set of new Adjacent Markets. If true, the findings from the analysis of new Adjacent Markets appear to be consistent with the anecdotal evidence presented in Chapter One that passengers are driving to Southwest Airports to take advantage of the lower fares. The observed decreases in market response in the new Adjacent Markets contrast sharply to increases in both O&D pdew and revenues pdew in Non-Southwest Markets over the same time period.
Therefore, it is concluded The Southwest Effect relates to the following characteristics of response is Adjacent Markets:

1. Southwest's presence at nearby airports appears to be correlated with market response in Adjacent Markets. However, the correlation appears to be limited to higher revenues pdew in Adjacent Markets vis-à-vis Non-Southwest Markets. The correlation between Southwest's presence and the average O&D pdew, if any, is not yet fully understood;

2. Southwest's entry into a nearby airport-pair as an effective competitor appears to be correlated with a decrease in the average number of O&D pdew in Adjacent Markets; and

3. Southwest's entry into a nearby airport-pair as an effective competitor appears to be correlated with a decrease in average market revenues pdew in Adjacent Markets.
Summary of conclusions

The primary objective of the study has been to determine the extent to which Southwest Airlines' presence might be correlated with the structure, conduct and response of deregulated airline markets. The study is motivated by the record financial losses of the airline industry, which have been attributed to low-fare competitors such as Southwest, and by government concerns Southwest is dominating the markets it serves. The study's findings tend to support claims by the other major carriers that Southwest's presence might be correlated with changes in market structure, conduct and response that, in turn, might have been a contributing factor to the record losses reported by other carriers. However, the findings do not support concerns regarding Southwest's use of market power to raise prices above competitive levels.

In 1988, the airline industry reported record profits, and Southwest was an effective competitor in 224, or 7.47 percent, of the top 3,000 revenue markets in the continental U.S.. By 1993, Southwest had become an effective competitor in 307, or 13.93 percent, of the top
3,000 revenue markets in the continental U.S.
Between 1988 and 1993, the airline industry amassed net losses of approximately $12.7 billion.

Although the rapid spread of Southwest's low-fare service is not solely responsible for the industry's unprecedented financial problems, the findings of the study do tend to support the claims in the U.S. Department of Transportation report by Bennett and Craun (1993) that Southwest's entry appears to be correlated with: (i) substantial reductions in the market's average fare; (ii) withdrawal from the market by an incumbent carrier; and (iii) high degrees of market concentration.

For example, Southwest Markets tend to have average fares which, in the aggregate, appear to be about one-half the average fares in airport-pairs where Southwest is not an effective competitor. In addition, Southwest Markets tend to have much lower average revenues than comparable Non-Southwest Markets. The stratification analyses suggest these important differences might be correlated with Southwest's entry into the markets.
Based on the findings of the analyses of Southwest's New Markets, it appears Southwest's entry into a market might be correlated with a substantial reduction in the market's weighted average fares, which in turn might be due to the combined impact of Southwest's low-fare and the competitive actions of incumbents who appear to offer more capacity at lower prices. As a result, O&D pdew in the New Market appears to be stimulated and market revenues appear to increase, but apparently not enough to support another competitor in the market. Therefore, the evidence suggests Southwest's entry appears to be correlated with the withdrawal of one effective competitor, apparently because the departing incumbent cannot attract enough new demand to offset the lower fares it must charge to be competitive with Southwest.

The changes observed in Southwest's New Markets appear to contrast sharply with the changes exhibited in Non-Southwest Markets between 1988 and 1993. In the Non-Southwest Markets, average one-way fares increased 26.45 percent, average O&D pdew increased 6.70 percent, and average market revenues pdew increased 34.94 percent. The behavior in Non-Southwest Markets seems to suggest
inelastic demand, and the significant increase in average fares might account for the conclusions of analysts such as James (1994) that passenger demand in the airline industry has matured.

By comparison, average fares in Southwest’s New Markets appear to have dropped an average of 43.14 percent (23.19 percent if Southwest’s fares are excluded from the average) from the year before Southwest’s entry to 1993. In addition, demand in Southwest’s New Markets appears to have increased an average of 134.31 percent and revenues appear to have increased an average of 46.67 percent. Southwest’s low-fare service appears to stimulate sufficient elastic demand that the market’s average revenues apparently increase despite the significant drop in average fares. The finding appears to be significant for an industry concerned about maturing demand.

Although Southwest’s entry appears to be associated with the withdraw of one effective competitor from the market, the study has shown that Southwest Markets appear to be at least as competitive as comparable markets where Southwest is not an effective competitor. Moreover, the evidence
suggests that in the markets where Southwest has become the dominant carrier, Southwest’s market share appears to be no greater than the market share of the incumbent carrier Southwest displaces.

Consequently, public policy concerns that The Southwest Effect is using market domination to affect monopoly pricing appear to be unfounded. In markets where Southwest has become an effective competitor, Southwest's low-fare service apparently displaces higher fare service offered by an incumbent such that the market’s average fare decreases. As a result, The Southwest Effect appears to be correlated with the low fares predicted by proponents of deregulation.

The results demonstrating the significance of The Southwest Effect might help analysts better understand the nature of competition in deregulated airline markets. For example, in an attempt to glean new insights into airline competition, the study examined not only Southwest Markets but also Adjacent Markets. The latter is important because the concept of an Adjacent Market has not been addressed rigorously in prior studies, even though
anecdotal evidence suggests The Southwest Effect extends to airport-pairs Southwest does not even serve. Findings from the analyses of Adjacent Markets suggest anecdotal evidence of a correlation between Southwest's presence and conduct and response in Adjacent Markets should be analyzed carefully because The Southwest Effect does not appear to generalize to all Adjacent Markets.

For example, the anecdotal evidence presented in Chapter Three suggests fares in Adjacent Markets are lower due to Southwest's presence at a nearby airport. However, the analysis of fares in 377 Adjacent Markets suggests that weighted average one-way fares in Adjacent Markets are higher than fares in most stratifications of comparable Corresponding Southwest Markets and higher than fares in most stratifications of Non-Southwest Markets. Moreover, fares in new Adjacent Markets do not exhibit the hypothesized decreases observed in fares in Southwest's New Markets. Indeed, it is concluded that, in general, the pattern of change in average fares in new Adjacent Markets does not appear to be correlated with Southwest's entry into a nearby market. It appears anecdotal evidence of the type shown in Table 5 which suggests a correlation
between Southwest's entry and lower fares in Adjacent Markets is relatively isolated and does not generalize.

The analysis of market response in Adjacent Markets also failed to support many of the hypothesized relationships. For example, the number of O&D pdew in most stratifications of Adjacent Markets appears to be either less than or nearly the same as traffic volumes in comparable Non-Southwest Markets. Adjacent Markets had been hypothesized to exhibit higher levels of demand than comparable Non-Southwest Markets. However, as hypothesized, most stratifications of Adjacent Markets have higher average revenues than comparable stratifications of Non-Southwest Markets. The inclusion in the analysis of some Adjacent Markets, that a priori, probably would not have been correlated with The Southwest Effect might have obscured the relationship between Southwest's presence and market response in Adjacent Markets.

On the other hand, the analyses of new Adjacent Markets does reveal substantial changes in market response that
appear to be consistent with anecdotal evidence passengers are driving to Southwest Airports to take advantage of the lower fares. Southwest's entry into a nearby airport-pair appears to be correlated with significant and permanent decreases in both average O&D pcew and average revenues pcew in the new Adjacent Markets. The decreases in the new Adjacent Markets contrast sharply to the observed increases in both O&D pcew and revenues pcew in the Non-Southwest Markets over the same time period.

Based on the findings of the analyses, it is concluded The Southwest Effect appears to be related to the following market characteristics:

1. Southwest's presence as an effective competitor appears to be correlated with more effective competitors and lower concentration vis-à-vis comparable markets where Southwest is not an effective competitor;

2. The correlation between Southwest's presence as an effective competitor and more competitive markets appears to weaken as length of haul increases;
3. Southwest's entry into a New Market appears to be correlated with the displacement of one incumbent from the airport-pair, but with no significant long-term change in the structure of the airport-pair;

4. Southwest's presence as an effective competitor appears to be correlated with lower average one-way fares vis-à-vis comparable markets where Southwest is not an effective competitor;

5. The correlation between Southwest's presence as an effective competitor and lower average fares appears to weaken as length of haul increases;

6. Southwest's entry into a New Market appears to be correlated with a significant and long-term decline in the weighted average one-way fare;

7. Southwest's presence as an effective competitor appears to be correlated with higher average O&D pdew and lower average revenues pdew than comparable markets where Southwest is not an effective competitor;
8. The correlation between Southwest's presence as an effective competitor and market response appears to change as length of haul changes;

9. Southwest's entry into a New Market appears to be correlated with a significant stimulation of both O&D pdew and market revenues pdew;

10. The Southwest Effect, if it is related to conduct in Adjacent Markets, is related in ways not yet fully understood;

11. Southwest's presence at nearby airports appears to be correlated with market response in Adjacent Markets. However, the correlation appears to be limited to higher revenues pdew in Adjacent Markets vis-à-vis Non-Southwest Markets. The correlation between Southwest's presence and the average O&D pdew, if any, is not yet fully understood;

12. Southwest's entry into a nearby airport-pair as an effective competitor appears to be correlated with a decrease in the average number of O&D pdew in Adjacent Markets; and

13. Southwest's entry into a nearby airport-pair as an effective competitor appears to be correlated with a decrease in average market revenues pdew in Adjacent Markets.
Managerial and policy implications

This section discusses the implications of the research findings for (i) passengers, (ii) airline employees, (iii) airport managers, (iv) airline managers, (v) policy makers and (vi) manufacturers and capital suppliers.

Passengers

The study confirms Southwest's reputation as a low-fare carrier. In markets where Southwest is an effective competitor, weighted average fares are 17.16 percent to 60.35 percent below the weighted average fares in comparable markets where Southwest is not an effective competitor. Moreover, the findings suggest a correlation between a decline in fares and Southwest's entry into a market.

Consumers in Southwest Markets apparently receive a double benefit of Southwest's entry. First, Southwest's entry introduces low-fares on Southwest flights. Second, competing carriers apparently offer more capacity at lower
fares in the markets where they compete against Southwest. Consequently, consumers have access to significantly lower fares on both Southwest and the incumbent carriers. As a result, it appears Southwest has created a new benchmark for the price of air travel in the minds consumers.

There are several favorable implications for consumers associated with the availability of lower fares in Southwest Markets. First, consumers who regularly travel by air are able to do so at significant savings compared to the cost of air travel prior to Southwest's entry. Second, the lower fares in Southwest Markets make air travel viable for consumers who might not otherwise travel or who would have driven to their destination. As a result, Southwest's lower fares enable more consumers to take advantage of the speed of air travel, thereby making travel more convenient. Third, to the extent low fares lure travelers out of their cars and onto airplanes, consumer safety is enhanced. Air travel statistically is safer than travel in private automobiles, and switching modes saves lives.
For consumers, the correlation between lower fares and Southwest's presence appears very favorable. However, the same cannot be said of the relationship between The Southwest Effect and employees of many of Southwest's larger competitors.

_Airline employees_

The major carriers that have survived the transition to deregulation appear to have been hard-pressed to compete with Southwest in short-haul markets, and the employees of airlines competing with Southwest apparently have been put into a difficult position. Southwest's entire focus is on frequent low-fare service in short-haul markets, and Southwest has been able to capitalize on the benefits of specialization. A relatively simple fare structure, a purely domestic route network, comparatively few connecting passengers, and open-seating in single-class cabins make for efficient check-in procedures for Southwest's ticket agents. Similarly, a standardized fleet of one aircraft type results in efficient scheduling, maintenance and training.
Southwest’s emphasis on a single type of operation differs from most other majors who offer a wide range of services in a variety of markets. Full-service carriers such as American, Delta or United offer a variety of menus, routings, and prices for passengers ranging from first-class international passengers to bargain-hunting leisure travelers. In addition, their large fleets of different aircraft types from different manufacturers combined with expansive route networks and concentrations of flights at congested hub airports also complicate the scale of their operations. By the nature of the airlines’ complex operations, employees of full-service carriers are trained for, and work in, an environment that is vastly different than Southwest’s. The employees of full-service carriers have been trained to provide a level of service that is not valued by price-sensitive passengers and not competitive with low-cost carriers in short-haul markets. On the other hand, employee expertise is valued by higher-fare passengers and can be a source of competitive advantage in longer-haul markets.
Not only do Southwest’s operations differ in complexity vis-à-vis most competitors’, but Southwest employees also have enjoyed a less threatening environment than their colleagues at most other major airlines. Southwest’s phenomenal success, which has been favorably and frequently reviewed by the media, combined with dynamic and charismatic leadership undoubtedly have helped maintain high levels of employee morale. By comparison, employees at most other major airlines have been exposed to job reductions and wage concessions while their companies struggle with unprecedented losses and corporate restructurings. Furthermore, employees at most major airlines have been confronted with unpleasant options when asked to help their companies deal with the competitive threat from low-fare carriers such as Southwest.

For example, there appear to be three tactics used in response to low-fare competition, and each has a detrimental impact on employees. First, the higher-cost airline can attempt to match prices, which, in the absence of cost-cutting, squeezes notoriously low profit margins even tighter. Second, the higher-cost airline can abandon the market. Third, the higher-cost airline can transfer
the route to a marketing partner who will continue to serve the market under a code-sharing agreement. From the employees' perspective, the first option implies reduced benefits and/or demands for more work, while the second and third options imply job losses or relocations. It appears employees of the major full-service airlines will continue to be confronted with unpleasant options due to The Southwest Effect.

In particular, displacement of workers at the full service carriers seems inevitable. Some positions will be terminated as full-service carriers abandon markets altogether or transfer them to code-sharing partners. Employees who can deliver a level of service that creates a competitive advantage for the carrier in the longer-haul markets probably will be retained. Dismissed employees who can adapt to a different operating environment might be able to hire on with the code-sharing partner.

In cases where the full-service carrier chooses to stay and compete by matching fares, employees also face unpleasant prospects. It seems reasonable to expect an employee who was trained for and understands a much more
complex system will become frustrated and overworked attempting to match the productivity of a Southwest employee. The combination of reduced benefits, the ever-present threat of displacement if the carrier eventually decides to abandon the market, and the frustration of not being able to offer a level of service the employee has been trained to provide suggest that accepting lower pay to compete directly with low-fare carriers is not in the employee's best long-term interest.

The recommended strategy for union representatives negotiating with full-service airlines attempting to deal with the competitive threat of low-fare competitors would be to have short-haul routes and affected employees transferred to smaller affiliated partners who will provide training for all of the displaced employees of the major. The advantages of such a strategy are three-fold. First, the employees' jobs are preserved. Second, experienced employees who know the larger carrier's operations will be retained in the system and will be retrained to work in the smaller and more efficient operation of the affiliated carrier. Third, employees
whose job has been saved by the union should be sympathetic to organizing efforts at the smaller carrier.

While the findings of the study might have unpleasant ramifications for some employees at Southwest's competitors, the findings do present key insights for airport managers seeking to lure Southwest to their airports.

_Airport managers_

The analyses of Southwest's New Markets and new Adjacent Markets suggest Southwest's presence appears to be correlated with changes in passenger volume in both groups of markets, and, by logical extension, the airports in the markets. In Southwest Markets, higher O&D pdew translates into higher enplanements, which, in turn, means higher airport revenues from parking and concessions at Southwest Airports, and higher entitlements under Federal Aviation Administration grant formulas. Conversely, Adjacent Airports appear to be experiencing a diversion of traffic, with a corresponding diversion of revenue from the
Adjacent Airports to nearby Southwest Airports. Consequently, it appears airport marketing efforts to attract Southwest are worth the effort. Furthermore, there appear to be many opportunities for Southwest to expand operations both within its existing network and to new stations.

In 1993, there were 451 airport-pairs in which Southwest served both airports but was not an effective competitor in the market, which would seem to represent ideal candidates for expansion, and the best targets for airport marketing efforts. Airport managers at Southwest Airports should target their marketing campaigns on attracting nonstop service to the other airports in Southwest's network. At airports not served by Southwest, the recommended strategy is similar — develop a marketing campaign based on linking an existing Southwest Airport to the unserved airport.

The recommended marketing message would stress the poor level of service in the market presently, the traffic stimulation potential in the market as evidenced by the amount of car traffic between the proposed cities, and the
abundant capacity at the airport which will efficiently accommodate Southwest’s fast turnaround service. While Southwest’s reputation of careful planning suggests the airline already is aware of the opportunity in each potential market, there is evidence to suggest Southwest will act quickly to prevent another low-fare carrier from getting established. Therefore, an airport manager intent on attracting Southwest might consider luring a competing low-fare carrier to the airport, which has three benefits.

First, if successful the strategy does introduce new low-fare service at the airport and traffic volumes should increase accordingly. Secondly, the presence of one low-fare carrier at the airport will provide a true gauge for Southwest of the market’s stimulation potential. Third, the entry of a competing low-fare carrier might force Southwest planners to alter their priorities and propose service at the airport in an effort to prevent the new entrant from becoming too well entrenched.

The desire of airport managers around the country to attract Southwest to their airports does not bode well for
managers at competing carriers who already have been adversely impacted by the growth of Southwest's low-fare service.

Airline managers

Developing effective responses to the competitive challenge of low-fare carriers apparently has not been easy for the managers of higher-cost full service carriers. A strategy of cutting costs to match fares while still striving to offer a full range of services to a diverse group of passengers does not appear to work, as evidenced by the huge losses amassed by American, Delta and United between 1990 and 1992.* It appears the industry might be headed towards a two-tier structure: (i) full-service carriers operating huge domestic and international route networks; and (ii) regional niche

* Industry profits began to recover in 1993, and had reached record levels by 1995. Industry analysts have attributed the record profits in 1995 to: (i) economic growth which stimulated travel demand; (ii) very conservative increases in industry capacity, which resulted in historically high average load factors; (iii) modest improvements in the industry's average yield per passenger; and (iv) very aggressive cost-cutting initiatives.
carriers specializing in short-haul flights whose unbundled product is designed to keep fares low."
Southwest, whose operations are designed to be simple, low-cost and short-haul, clearly fits into the second category.

To date, a full-service carrier has not been able to profitably offer a more complex product at Southwest's lower fares. Therefore, it is recommended full-service carriers continue the process of transferring their short-haul routes to lower-cost affiliates whose operations and costs are more competitive with Southwest's. With such a strategy, the full-service carrier maintains an indirect presence in the market through code-sharing, while removing the financial drain of trying to compete with lower fares. The experience of Continental Lite demonstrates the inadvisability of an airline attempting

"Ironically, such a two-tier industry structure, were it to evolve in the post-deregulation environment, would, in some respects, resemble the industry structure devised by the Civil Aeronautics Board after World War II. The CAB granted long-haul routes to designated Trunk carriers and short-haul regional routes to Local Service Carriers, and generally prevented competition within and between the two tiers of carriers."
to compete simultaneously as both a full-service and a low-fare carrier.

Continental has been through Chapter 11 reorganization twice since deregulation, and, as a result, has some of the industry's lowest costs. In the early 1990s, Continental's strategy was to operate as a large-scale full-service carrier and to use its cost advantage over other full-service carriers to restore itself to financial health. However, in 1993, Continental decided to launch Continental Lite as an airline-within-airline.

Continental essentially became two airlines, the old full-service Continental continued as before, and Continental Lite provided low-cost no-frills service. The latter was clearly patterned on the Southwest model. Despite some early success, the Continental Lite experiment proved to be an expensive failure, and "wound up costing Continental at least $120 million"\(^ {127} \) in 1994.

Three reasons have been cited for the abysmal failure of the Continental Lite operation which was finally shut down
in mid-1995. First, inconsistent service levels drove away loyal Continental passengers. Second, in its attempt to duplicate Southwest's frequent short-haul service, Continental added too many flights in markets that lacked sufficient stimulation potential to fill the airplanes. Third, management was spread too thin and consumers became confused as Continental tried to be "two things at once: full-service in certain markets and low-cost in others."128

The failure of the Continental Lite experiment suggests the Southwest model is not easy to duplicate. Continental had lower than average costs and was well known in many of the eastern markets where Continental Lite was introduced. Therefore, the failure of Continental Lite serves as a warning to established full-service carriers that successful operation of a low-cost niche airline involves more than duplicating Southwest's methods. Consequently, it is recommended that full-service carriers seeking to remain competitive in short-haul markets do so via marketing agreements with carriers who specialize in such operations.
Given the strong presence Southwest appears to have in short-haul markets, it is reasonable to assume airline managers are concerned about the spread of The Southwest Effect to longer-haul markets. Over the near-term it appears Southwest will have little incentive to shift its focus from short-haul to longer-haul markets. In 1993, there were 27 short-haul markets under 500 miles in which Southwest served both airports but was not an effective competitor (e.g., Cleveland-Detroit and Baltimore-Columbus). Moreover, the 1994 acquisition of Morris Air added seven new stations to Southwest’s route network—Boise, Orange County, Portland, Salt Lake City, Seattle, Spokane, and Tucson.

Southwest Chairman Keileher has stated the focus will be to "connect the dots within our route system", and Southwest’s Chief Financial Officer has stated "the short-haul market potential easily is double its present size". Not only does there appear to be substantial growth potential within Southwest’s own network of short-haul markets, there also existed 332 short-haul Non-
Southwest Markets in 1993. Therefore, it seems unlikely Southwest will change its highly successful short-haul strategy.

Based on the company's stated objective to offer fares competitive with the cost of driving, and the diminishing impact of The Southwest Effect in longer haul markets, it seems unlikely that Southwest will become a major competitor in many long-haul airport-pairs. Consequently, the full-service carriers are advised to remain focused on the long-haul operations across their vast networks.

Another pressing issue for managers of the incumbent carriers, is the extent to which new entrant carriers such as Reno, ValuJet and Western Pacific will be able to penetrate existing markets with their low fare services, and whether they will have the same impact as Southwest on market structure, conduct and response. Given that there were 332 short-haul Non-Southwest Markets in 1993 and given that average fares in short-haul Southwest Markets were substantially below average fares in comparable Non-Southwest Markets it would appear the other low-fare
carriers have not yet had a major impact in Non-Southwest Markets.

Moreover, between 1988 and 1993, fares in short-haul Non-Southwest Markets increased more than fares in medium-haul or long-haul Non-Southwest Markets. Therefore, it appears the new entrants have not yet become established as significant competitors, which is not surprising given their relative short time in operation and much smaller scopes of operation. However, Southwest has become the model of a successful post-deregulation carrier, and to the extent that the new entrants can duplicate Southwest, they pose a threat to the incumbent full-service carriers.

Based on the stimulating effect of lower fares on market response observed in Southwest Markets, the long-term outlook for the new generation of low-fare carriers seems favorable. At yearend 1993, the 332 short-haul Non-Southwest Markets had average fares 84.21 percent greater than average fares in comparable Southwest Markets when Southwest's fare was excluded. In addition, at yearend 1993, there were 1,231 medium-haul Non-Southwest Markets with fares 36.43 percent greater than average fares in
comparable Southwest Markets when Southwest’s fare was excluded. The finding suggests there are over 1,500 short-haul and medium-haul Non-Southwest Markets in which the new entrants could successfully introduce their low fare service.

It appears the post-deregulation evolution of the airline industry is far from complete, and its continuing evolution is of great interest to public policy makers.

_Policy makers_

The publication of Bennett and Craun’s 1993 analysis of The Southwest Effect for the U.S. Department of Transportation suggests the federal government has become sufficiently concerned about the success of Southwest to release an official report. The government’s stated concern was that Southwest was becoming too successful and was eliminating the competition perceived to be necessary to keep fares low.
In his criticism of deregulation, Dempsey appears to echo the concerns of regulators who are worried a dominant firm such as Southwest will exercise its market power to charge unreasonably high fares:

"government regulation should be imposed to prohibit the extraction of monopoly or oligopoly rents. An industry-wide mileage-based formula could be devised as a benchmark by which to assess the reasonableness of rates... Regulation of rates should be imposed only where the airline has sufficient market share so that it might be in a position to exert market power. Thus, rate review might only be imposed upon complaint of consumers, or in city-pair markets in which the offending airline has more than say, 40 percent of the market... and where the rate in question exceeds an industry measure of fully allocated costs plus, say, 15 percent... The range of rates ought to include not only a ceiling, but also a floor to prohibit predatory pricing, and pricing below fully compensatory levels."\(^{131}\)

The analysis suggests Southwest's presence is correlated with lower fares, and regulatory policies such as the ones proposed by Dempsey might actually hamper Southwest's efforts to expand its low-fare service. For example, the analysis suggests Southwest's average fares are substantially below competitors'. How would regulators establish an industry price-floor based on industry-wide costs when there are carriers such as Southwest with
substantially lower costs and lower fares? Would not a price-floor preclude innovative pricing by carriers such as Southwest? While regulatory policies to prevent predatory pricing are desirable, such policies might obstruct competitive pricing by low-fare carriers. Therefore, it is recommended no attempt should be made to re-regulate domestic fares.

The recommendation against fare regulation is based on two other observations from the analyses. First, Southwest Markets appear to be as competitive as Non-Southwest Markets. Second, although other major carriers apparently cannot discipline Southwest's prices, the carrier's success in short-haul operations appears to be due in large part to its commitment to frequent low-fare service as its competitive advantage. Southwest claims ground transportation is its major competition in the short-haul routes where it derives the majority of its revenues, and Southwest Chairman Kelleher has stated "it is the out-of-pocket expenses of driving which will restrict the extent to which Southwest can increase fares"132.
Consequently, it appears Southwest’s pricing behavior will be disciplined by costs of surface transportation in short-haul markets. Therefore, Bennett and Craun’s claims in the Department of Transportation report that Southwest might use market power to extract monopoly prices are not evident in the observed findings and appear to be unfounded.

Two other constituencies with an interest in the findings of the study are aircraft manufacturers and the suppliers of capital to the airline industry.

Manufacturers and capital suppliers

In a 1993 speech at the FAA’s annual aviation forecast conference, James argued air travel demand in the U.S. had matured. If so, airline demand for new equipment would be expected to slow to roughly the growth of the Gross Domestic Product. The mature industry argument appears to be based on the absence of either a new technological or a regulatory stimulus to reduce costs and
airline fares as have occurred regularly in the industry's past.

The present study of The Southwest Effect reveals substantial market growth appears to be correlated with Southwest's low-fare service. In New Markets, average Origin and Destination passenger demand more than doubled in many of the New Markets after Southwest entered. Therefore, it appears The Southwest Effect might provide the needed market stimulus to boost travel demand and sustain future orders of new aircraft.

Moreover, if the other major carriers transfer their short-haul routes to low-fare code-share partners, the long-term prospects of the latter will be enhanced and they represent a source of long-term demand for new aircraft. The trade-off will be less demand from the traditional major carriers who will experience relatively slower growth in their longer-haul markets. Accordingly, suppliers of capital will probably direct more funds to the low-fare carriers who can effectively stimulate short-haul demand.
Issues for further study

The present study has attempted to build upon prior research on market structure and conduct in the deregulated airline industry and on specific studies of Southwest. Additional research is needed to validate the findings of the present study and to address other issues which are either beyond the scope of the present study or which emerged during the study. In particular, three issues appear to offer significant potential for additional research: (i) analysis of other new entrants; (ii) analysis of the impact on airport catchment areas; and (iii) analysis of Southwest Market characteristics. Each of the three issues as a topic for future research is discussed in greater detail.

Analysis of other new entrants

Southwest Airlines was chosen as the focus of the present study for three reasons. First, the airline’s enviable record of consistent profitability and steady growth contrasts sharply with the record losses, bankruptcies and
massive restructurings which occurred at other major carriers between 1989 and 1993. Second, the U.S. Department of Transportation published a report by Bennett and Craun (1993) citing Southwest as the driving force of change in the airline industry. Third, several new entrant carriers (e.g., ValuJet and Western Pacific) have recently commenced operations and cited Southwest as their role model.

An analysis of Southwest as a role model for other new entrants might attempt to determine how similar are the operations, costs, fares and services of the new entrants to Southwest's successful formula? Such an analysis should be of considerable interest to employee groups, airline managers and policy makers, and is deserving of further consideration. Data on fares and services of the new entrants is available in the O&D Survey and the Official Airline Guide (O.A.G.) Aggregate cost data is available from the U.S. Department of Transportation and financial statements, and overviews of airline operations are available in financial statements and published analysts' reports for publicly-traded carriers.
An astute analyst might be able to pull together enough information from all of the sources to enable meaningful comparisons of operations, costs, fares and services of the new entrants. If so, the findings would provide insight into the extent to which the new entrants can copy the Southwest model and spread low-fare service to other parts of the country. Moreover, the findings would be useful in determining the long-term prospects of the current crop of new entrants. Finally, such an analysis could ascertain whether markets in which new entrants have become effective competitors have undergone the same types of changes in structure, conduct and response as observed in Southwest Markets. The results of such analyses would be helpful to policy markers attempting to foresee the future of the airline industry.

**Analysis of airport catchment areas**

Anecdotal evidence presented in Table 5 suggests, and the analysis partially supports, The Southwest Effect extends to airport-pairs not served by Southwest. Based on the stimulation of O&D pdeu in Southwest Markets, it is
logical to conclude that the end-point airports benefit from the stimulation in market demand. For example, it has been concluded that some of the growth in O&D pdeW in Southwest Markets might have been due to the diversion of traffic from Adjacent Markets, and such diversion would be expected to have an impact on enplanements at both the Southwest Airports and the Adjacent Airports.

Although the analysis of Adjacent Markets in the present study was not designed to explore a potential relationship between Southwest's presence and an airport's catchment area, the study has suggested O&D pdeW in new Adjacent Markets has fallen sharply after Southwest enters. By comparison, O&D pdeW in Southwest Markets and Non-Southwest Markets has increased. The findings suggest some diversion of traffic might have occurred in the new Adjacent Markets.

The present study reveals further research is needed to determine consumer willingness to drive to another airport to take advantage of lower fares. In particular, the issue raises four questions for future study. First, how
much do fares have to differ to motivate consumers
to drive to another airport to take advantage of lower
fares? Second, how far will consumers drive to take
advantage of lower fares? Third, how do differences in
fare interact with how far consumers are willing to drive?
Finally, can more frequent service be used to offset lower
fares at another airport? Answers to the questions should
be of interest to airline and airport managers and to
policy makers.

To determine more precisely whether a relationship exists
between The Southwest Effect and an airport's catchment
area, at least two alternative methods are feasible. One
approach might be to compare actual enplanements at
Southwest Airports and Adjacent Airports, adjusting for
differences in the levels of service at each airport. A
second approach would be to limit the number of Adjacent
Markets used in the analysis. The present study used a
very broad definition of Adjacent Markets and a smaller
sample might provide more useful insights. The potential
of Southwest to affect an airport's catchment area is an
important issue to managers of airports competing for
revenues and air service in the deregulated environment.
Therefore, this issue would seem to warrant considerable further study.

Analysis of Southwest Market characteristics

The objective of the present study is to explore possible relationships between Southwest’s presence and market structure, conduct and response. The study was not designed to study whether Southwest’s presence actually caused the observed characteristics of structure, conduct and response. Therefore, a potentially fertile area of future study would be to use experimental design to examine whether The Southwest Effect is a causal factor in the observed changes to market structure, conduct and response.

In addition, Southwest has attributed some of its success to being able to take advantage of opportunities as they emerge. The present study characterized Southwest Markets along only two dimensions — traffic density and length of haul. No attempt was made to analyze the characteristics of the markets Southwest chose to serve or the markets
where Southwest was an effective competitor. However, an analysis of the inherent characteristics of an airport-pair prior to Southwest's entry would provide key insights to airline and airport planners and to policy markers.

An analysis of market characteristics could examine, among other things, air service variables such as the level of O&D demand and market revenues; demographic variables of the cities such as population, income and buying levels; geographic factors such as distance to the nearest Southwest Airport, highway links between the cities, and weather patterns; and airport variables such as terminal facilities, airside congestion, and rates and charges. Using such variables as inputs, it would be possible to develop a descriptive model of the typical Southwest Market, and the model might also be used to predict the airports where Southwest is most likely to add service in the future. By taking into account the unique characteristics of each airport-pair, the model also could be used to account for the observed differences between Southwest Markets and Non-Southwest Markets in market structure, conduct and response.
A related issue worthy of further study is the consumer learning process associated with the introduction of service in a new market by Southwest. The number of Southwest Markets in the top 3,000 markets in the continental U.S. changes from year to year as some Southwest Markets out-perform while others under-perform national averages. It would be interesting to study in greater depth consumer behavior in individual markets.

The present study focused on broad measures of market conduct and response, but airline managers are concerned about selling tickets to passengers. Therefore, it would be useful to study in more detail how consumers have responded to Southwest. For example, the present study used yearly averages without adjusting for services offered less than one year. Therefore, 1993 results in the analyses of New Markets tended to differ from results from the other years’ New Markets because Southwest had been an effective competitor in the 1993 New Markets for less than one year. It would have been helpful to know the learning curve for consumer awareness and adoption of Southwest’s service.
Moreover, the analysis of market response revealed demand in New Markets tended to be relatively elastic. However, more research is needed to determine the exact level of demand elasticity, which would provide airline and airport planners with valuable knowledge of how consumers can be expected to respond to various fare initiatives. In addition, airline manufacturers could use such insights to determine the future demand for aircraft based on the stimulating impact of low-fare service.

In addition, it would be interesting to know more about the competitive structure of Southwest Markets, especially the role service levels plays. The analysis of market response provided some confusing, and occasionally contradictory, findings. The inconsistent findings of market response, especially when measured by the number of Origin and Destination passengers per day each way, have been attributed to differences in the level service provided by Southwest vis-à-vis its competitors. The analysis did not attempt to measure the levels of service in a market, and it would be insightful to analyze how Southwest’s low-fares interact with the level of service
to affect market response. Taneja (1968)\textsuperscript{134} found that frequency has a significant impact on market share, which suggests Southwest’s frequent service could account for some of the observed response in Southwest Markets.

An analysis of service levels could answer three important questions. First, how much of the stimulating impact of Southwest’s presence on market response was due to lower fares and how much was due to the addition of more direct service? Second, how many Southwest Markets were not served with nonstop flights and what impact did the lack of nonstop service have on Southwest’s market share? Third, can frequent nonstop service be an effective competitive response to Southwest’s low fares?

To answer the questions, it would be necessary to consult a source of industry schedules, such as the Official Airline Guide (O.A.G.), which lists all the direct flights, nonstop and multiple-stop, between two airports. Each carrier’s share of direct service in a market could be adjusted according to nonstop versus multiple-stop flights, and the resultant shares of service could be compared with each carrier’s average fare to determine the
impact of level of service on fares. Similarly, fare and share of service data could be compared with share of market revenues or share of market O&D pdew to determine the joint impact of fare and share of service on market response. Accounting for both fares and shares of service might provide better insight into market response than fares alone has done in the present study.

The present study does not attempt to establish relationships between Southwest's market share and the fares, O&D pdew or revenues pdew in the markets. In the present study, an effective competitor is defined as having at least a 10.00 percent share of the market revenues, and the 10.00 percent level is chosen based on prior studies. However, it would be insightful to analyze the relationship between market share and the relationship between The Southwest Effect and market structure, conduct and response. For example, such an analysis might be able to determine if there is a threshold level above which The Southwest Effect applies.

Another market share issue worthy of further consideration is the choice of variable used to determine market share.
The present study is based on shares of market revenues. However, prior studies have used market shares based on the number of O&D pdew and the level of service. The latter measure would be especially interesting to airline managers at full-service carriers who might be able to counter The Southwest Effect of lower fares by offering a higher level of nonstop service in the market. Using different levels of market share to define an effective competitor, such as one percent or five percent, and different variables to measure market share, such as share of O&D pdew or share of capacity, would offer validation of the present findings and produce new findings with valuable managerial implications.

It also would be interesting to examine in greater detail the changes in market conduct that occur in Southwest Markets over time. The U.S. Department of Transportation was concerned Southwest was driving out competitors and using the resultant market power to begin charging above-average prices in the absence of competitive discipline. Although the analysis does not appear to support the claims, the analysis is limited in the number of Southwest Markets and the time period. Only fares in the 107 New
Markets are tracked over a five year period from 1989 through 1993.

A time series analysis designed to track trends in fares in individual Southwest Markets over time would be able to address the issue of whether Southwest's pricing is disciplined by the costs of driving in the long-run. The sample would consist of a set of markets Southwest served continually over a given time horizon, and the weighted average fares in each market could be computed annually from the O&D Survey data. Changes in fares in Southwest Markets could be compared to changes in conventional inflation indices, or to travel indices prepared by auto clubs or to a set of comparable Non-Southwest Markets. The analysis probably should take into account any changes in the level of service offered by Southwest or competitors in each airport-pair over the time period used in the analysis. Findings from such an analysis would be highly valued by policy makers concerned about the growth of The Southwest Effect.
Summary of Chapter Five

Southwest’s presence does appear to be correlated with the structure, conduct and response in markets where Southwest is an effective competitor. In terms of market structure, Southwest Markets are observed to be at least as competitive as Non-Southwest Markets, but Southwest’s entry appears to be correlated with the displacement of one incumbent carrier. The analyses of market conduct revealed Southwest’s presence is correlated with lower fares in the airport-pairs where Southwest is an effective competitor. Market response to Southwest’s presence as an effective competitor appears to be influenced by more than just fares, although Southwest’s presence appears to be correlated with both higher O&D pdew and higher revenues pdew. In addition, The Southwest Effect on response appears to extend to the set of new Adjacent Markets, but The Southwest Effect does not generalize to all Adjacent Markets.

Based on the findings of the analyses, it is recommended that full-service major carriers transfer short-haul routes where they compete with Southwest to other carriers
under code-sharing agreements. The transfers would enable the major to maintain a presence in short-haul markets, thereby preserving the synergies of hub-and-spoke networks. The transfers also can be beneficial to displaced employees of the full-service major if union negotiators arrange for the displaced employees to be hired and retrained by the code-share partner. Airport managers were advised to develop marketing plans demonstrating the viability of linking their airports with adjacent Southwest Airports. Airport managers also were advised to consider attracting other low-fare carriers as an incentive to Southwest to reprioritize its planned service expansions. The observed findings did not support concerns that Southwest was using market power to charge above-average fares, and policy makers need not be concerned with the rapid growth of The Southwest Effect.

The chapter concluded with a discussion of three topics for further research — an analysis of other new entrants; an analysis of airport catchment areas; and an analysis of characteristics of Southwest Markets.
GLOSSARY

Adjacent airport: An airport which meets all three of the following conditions: (a) an airport not served by Southwest at yearend 1993; (b) an airport located within 150 air-miles of an airport served by Southwest at yearend 1993; and (c) an airport ranked among the top 100 airports in the continental U.S. based on total Origin and Destination (O&D) traffic in 1993. Appendix A lists the 36 airports Southwest served at yearend 1993 and their respective Adjacent Airports.

Adjacent Market: An airport-pair meeting all three of the following conditions: (i) the market was ranked among the top 3,000 airport-pairs in the continental U.S. in 1993; (ii) one airport was served by Southwest at yearend 1993; and (iii) the other airport was an Adjacent Airport. For example, the Baltimore-Chicago O’Hare market is an Adjacent Market because Southwest serves Baltimore but not
O'Hare and O'Hare is an Adjacent Airport to Chicago Midway.

Excluded from the definition of Adjacent Markets are airport-pairs involving Dallas/Ft. Worth International Airport (DFW) if the non-DFW airport in the pair cannot be served from Dallas' Love Field (DAL). The 1979 Wright Amendment to the International Air Transportation Competition Act limits airlines serving Love Field to intrastate Texas service and interstate service only to cities in contiguous states — Arkansas, Louisiana, New Mexico and Oklahoma. Passengers traveling between DAL and cities beyond Texas or the contiguous states are required to buy two tickets and to transfer to another airplane. Therefore, there is no O&D Survey data for DAL airport-pairs beyond Texas or the contiguous states.

Also excluded from the definition of Adjacent Markets are airport-pairs in which the Adjacent Airport is paired with the corresponding Southwest Airport to which it is adjacent. For example, Atlanta is an Adjacent Airport to Birmingham. The Atlanta-Birmingham airport-pair is not
counted as an Adjacent Market because there is no other Southwest Airport within 150 miles of Atlanta which passengers could use for air travel between Atlanta and Birmingham.

Airport-pair: The two airports comprising the airport of origin and the airport of destination for a passenger trip. Not included in an airport-pair is any airport where the passenger stops en route. For example, the airport-pair for a passenger whose trip originates at Port Columbus (CMH) and ends at Kansas City International (MCI) is CMH - MCI, even though the passenger’s flight might stop at St. Louis (STL), or require a change of planes at Chicago’s O’Hare (ORD) airport.

Average fare: The weighted average fare of all passengers in an airport-pair market, including non-revenue passengers. In some of the analyses, Southwest’s fare is excluded from the computation of the weighted average fare, in which cases the weighted average fare is the average of all carriers in the market, except Southwest. All cases were noted when Southwest’s fare has been
excluded from the computation of the market’s weighted average fare.

*Catchment area:* An airport’s service territory. For example, the catchment area for the Indianapolis airport is defined as the geographic area containing all cities in which people live who use the Indianapolis airport.

*Corresponding Southwest Market:* An airport-pair which meets both of the following conditions: (i) Southwest served both airports at yearend 1993 and (ii) there was a corresponding Adjacent Market. For each Adjacent Market there is at least one Corresponding Southwest Market. For example, Baltimore-Chicago Midway is the Corresponding Southwest Market for the Baltimore-Chicago O’Hare, Chicago Midway-Washington National and Chicago Midway-Washington Dulles Adjacent Markets.

*Effective competitor:* An airline with at least a 10.00 percent share of total revenues in a market.
Enplanement, enplaned passenger: A passenger who boards an aircraft. A connecting passenger whose itinerary requires a change of planes is counted as two enplanements — one enplanement at the airport of origin, and a second enplanement at the airport where the connecting flight is boarded.

Herfindahl-Hirschman Index (HHI): The sum of the squared market shares of each firm in the market. A market with three equally-sized competitors would have a Herfindahl-Hirschman Index of 0.33333 \((0.333)^2+(0.333)^2+(0.333)^2\); whereas, a market in which two fringe-firms each with a ten percent share competed with a dominant firm with an eighty percent share, the Herfindahl-Hirschman Index would be 0.66000 \((0.10)^2+(0.10)^2+(0.80)^2\). The Herfindahl-Hirschman Index provides a guideline of the relative concentration of market shares — the closer the Herfindahl-Hirschman Index is to 1.0000, the greater the concentration of market share in a single firm.
Hub airport: An airport identified in the 1993 Annual Report of a Major carrier as a connecting point in the carrier’s hub-and-spoke route network. The following airports were identified as Hubs by their respective carriers and were classified as Hubs in the regression analyses:

American: DFW, ORD, BNA, RDU, SJU, MIA
America West: PHX, LAS, CMH
Continental: EWR, IAH, CLE, DEN
Delta: ATL, CVG, LAX, MCO, SLC
Northwest: DTW, MSP, MEM
TWA: STL, JFK
United: ORD, DEN, SFO, IAD
USAir: PIT, CLT, PHL, BWI

Some of the aforementioned Hub airports (e.g., American’s BNA and RDU and Continental’s DEN) have since been closed.

Length of haul: The weighted average total distance traveled by all O&D passengers in an airport-pair market. The weighted average is the sum of each O&D passenger’s actual trip length, which takes into account all of the routings used by O&D passengers in an airport-pair during the year. The length of haul usually is greater than the nonstop distance between two airports because of the inclusion of connecting passengers whose itineraries involve indirect routings.
Major carrier: The U.S. Department of Transportation classification for certificated carriers with annual revenues in excess of $1 billion. In 1994, the Major carriers were America West, American, Continental, Delta, Federal Express, Northwest, Southwest, Trans World, United, United Parcel Service, and USAir.

Market conduct: The weighted average one-way fare in an airport-pair in a given year.

Market response: The average number of Origin and Destination passengers per day each way and/or the average market revenues per day each way of all carriers in an airport-pair market.

Market revenues (also revenues pdew): The average revenues per day each way generated by all carriers in an airport-pair market.
Market structure: The number of effective competitors and the level of concentration measured by the Herfindahl-Hirschman Index in an airport-pair in a given year.

New Market: An airport-pair which meets both of the following conditions: (i) Southwest became an effective competitor in the market between 1989 and 1993; and (ii) the airport-pair was a Southwest Market at yearend 1993. New Markets do not include airport-pairs Southwest entered between 1989 and 1993 if Southwest's share of total market revenues later fell to less than 10.00 percent any time during the 1989 to 1993 time period.

Non-Southwest Markets: An airport-pair which meets all five of the following conditions: (i) one of the top 3,000 airport-pairs in the continental U.S. in a given year ranked by market revenues; (ii) Southwest was not an effective competitor in the airport-pair in the given year; (iii) no more than one airport in the pair was served by Southwest in the given year; (iv) the airport-pair was not classified as an Adjacent Market in the given year; and (v) the airport-pair had an average length of
haul less than the longest-haul Southwest Market in the given year. In the analyses of Adjacent Markets, condition (v) in the definition is modified to exclude all markets with a length of haul longer than the longest-haul Adjacent Market in the given year.

*Origin and Destination passengers per day each way (O&D pdew):* The average daily number of passengers traveling each direction in an airport-pair based on point of origin and point of destination, without regard to routing. For example, if in a given year there are 50,000 passengers destined for San Francisco International Airport (SFO) who originate their trip at Cleveland Hopkins Airport (CLE) and if there are 65,000 passengers bound for CLE who originate their trip at SFO, the total number of Origin and Destination passengers in the CLE-SFO market is 115,000, and the O&D pdew is 157.7 (i.e., (115,000/2)/365). There are many possible routings for the passengers (e.g., nonstop or connecting at ORD, DTW, STL, etc.), but they are counted as O&D pdew in only the CLE-SFO market, regardless of routing.

*Revenues pdew:* See Market revenues.
Slot airport: One of four severely congested airports (i.e., Chicago O'Hare, New York La Guardia, New York Kennedy, and Washington National) where the Federal Aviation Administration imposes hourly quotas on the number of takeoffs and landings at each airport. Each airline serving any one of the four airports must obtain an operating right (i.e., a slot) to takeoff or land at a specific time.

Southwest Airlines Company, Inc. (Southwest): One of the 11 carriers classified as a Major by the U.S. Department of Transportation. According to the Air Transport Association of America, Southwest ranked sixth in passengers, eighth in revenue passenger miles and ninth in total operating revenues among the top 25 airlines in the U.S. in 1994. Southwest is the only one of the Majors which does not operate international flights.

Southwest Airport: An airport receiving scheduled service by Southwest Airlines. See Appendix A for a list of Southwest Airports at yearend 1993.
Southwest Market: An airport-pair which meets both of the following conditions: (i) the airport-pair was among the top 3,000 markets in the continental U.S. in a given year ranked by market revenues; and (ii) Southwest had at least a 10.00 percent share of the market's total revenues in the given year.

The Southwest Effect: The title of a 1993 U.S. Department of Transportation report by Bennett and Craun that provides a basis for the hypothesized correlation between Southwest's presence and market structure, market conduct and market response. Southwest's presence is hypothesized to be correlated with the following market characteristics:

(i) Southwest Markets are hypothesized to have fewer competitors and are more concentrated vis-à-vis markets in which Southwest is not an effective competitor;

(ii) Southwest Markets are hypothesized to have lower fares, higher average O&D pdew and higher market revenues pdew vis-à-vis markets in which Southwest is not an effective competitor;
(iii) Southwest's entry as an effective competitor is hypothesized to be correlated with lower fares, higher O&D pdeW, and higher revenues pdeW;

(iv) Adjacent Markets are hypothesized to have lower fares, higher O&D pdeW and higher market revenues pdeW vis-à-vis markets in which Southwest is not an effective competitor; and

(v) Southwest's entry in a nearby airport-pair is hypothesized to be correlated with lower fares, higher O&D pdeW, and higher revenues pdeW in the Adjacent Market.

**Tourist market:** An airport-pair in which at least one of the airports in the pair includes one of the following airports: Las Vegas, Phoenix, Reno, Tucson, or any one of the 15 commercial service airports in Florida.

**Wright Amendment:** The 1979 Wright Amendment to the International Air Transportation Competition Act limits airlines serving Dallas Love Field (DAL) to intrastate Texas service and to interstate service only to cities in contiguous states — Arkansas, Louisiana, New Mexico and Oklahoma. Passengers traveling between DAL and airports
in cities beyond Texas or the contiguous states are required to buy two tickets and to transfer to another airplane to continue their itineraries. The Wright Amendment was enacted to force the major carriers to move their Dallas operations from Love Field to the newly opened Dallas/Ft. Worth International Airport.
APPENDIX A

SOUTHWEST AIRPORTS AND ADJACENT AIRPORTS
### Table 57  Southwest Airports, by Year Service Started

<table>
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<tr>
<th>Pre-1978</th>
<th>AUS</th>
<th>CRP</th>
<th>DAL</th>
<th>ELP</th>
<th>HOU</th>
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<th>MAF</th>
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### Table 58  Southwest Airports in Alphabetical Order, by Identifier

<table>
<thead>
<tr>
<th>ABQ</th>
<th>Albuquerque</th>
<th>LBB</th>
<th>Lubbock</th>
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<tbody>
<tr>
<td>AMA</td>
<td>Amarillo</td>
<td>LIT</td>
<td>Little Rock</td>
</tr>
<tr>
<td>AUS</td>
<td>Austin</td>
<td>MAF</td>
<td>Midland/Odessa</td>
</tr>
<tr>
<td>BHM</td>
<td>Birmingham</td>
<td>MCI</td>
<td>Kansas City</td>
</tr>
<tr>
<td>BNA</td>
<td>Nashville</td>
<td>MDW</td>
<td>Chicago</td>
</tr>
<tr>
<td>BUR</td>
<td>Burbank</td>
<td>MSY</td>
<td>New Orleans</td>
</tr>
<tr>
<td>BWI</td>
<td>Baltimore</td>
<td>OAK</td>
<td>Oakland</td>
</tr>
<tr>
<td>CLE</td>
<td>Cleveland</td>
<td>OKC</td>
<td>Oklahoma City</td>
</tr>
<tr>
<td>CMH</td>
<td>Columbus</td>
<td>ONT</td>
<td>Ontario</td>
</tr>
<tr>
<td>CRP</td>
<td>Corpus Christi</td>
<td>PHX</td>
<td>Phoenix</td>
</tr>
<tr>
<td>DAL</td>
<td>Dallas</td>
<td>RNO</td>
<td>Reno</td>
</tr>
<tr>
<td>DTW</td>
<td>Detroit</td>
<td>SAN</td>
<td>San Diego</td>
</tr>
<tr>
<td>ElP</td>
<td>El Paso</td>
<td>SAT</td>
<td>San Antonio</td>
</tr>
<tr>
<td>HOU</td>
<td>Houston</td>
<td>SDF</td>
<td>Louisville</td>
</tr>
<tr>
<td>HRL</td>
<td>Harlingen</td>
<td>SFO</td>
<td>San Francisco</td>
</tr>
<tr>
<td>IAH</td>
<td>Houston</td>
<td>SJC</td>
<td>San Jose</td>
</tr>
<tr>
<td>IND</td>
<td>Indianapolis</td>
<td>SMF</td>
<td>Sacramento</td>
</tr>
<tr>
<td>LAS</td>
<td>Las Vegas</td>
<td>STL</td>
<td>St. Louis</td>
</tr>
<tr>
<td>LAX</td>
<td>Los Angeles</td>
<td>TUL</td>
<td>Tulsa</td>
</tr>
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</table>

Airports served by Southwest at yearend 1993.
### Table 59  Southwest Airports and Adjacent Airports

<table>
<thead>
<tr>
<th>Southwest’s 1993 Airports</th>
<th>Adjacent Airport(s) Within 150 Air-Miles</th>
</tr>
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<tbody>
<tr>
<td>ABQ</td>
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<tr>
<td>AMA</td>
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</tr>
<tr>
<td>AUS</td>
<td>none</td>
</tr>
<tr>
<td>BHM</td>
<td>ATL  HSV</td>
</tr>
<tr>
<td>BNA</td>
<td>HSV</td>
</tr>
<tr>
<td>BUR</td>
<td>SNA</td>
</tr>
<tr>
<td>BWI</td>
<td>DCA  IAD  MDT  PHL  RIC</td>
</tr>
<tr>
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<td>PIT</td>
</tr>
<tr>
<td>CMH</td>
<td>CVG  DAY  PIT</td>
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<td>GRR</td>
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<td>HOU</td>
<td>none</td>
</tr>
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<td>HRL</td>
<td>none</td>
</tr>
<tr>
<td>IAH</td>
<td>none</td>
</tr>
<tr>
<td>IND</td>
<td>CVG  DAY  LEX</td>
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<td>LAS</td>
<td>none</td>
</tr>
<tr>
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<td>SNA</td>
</tr>
<tr>
<td>LBB</td>
<td>MEM</td>
</tr>
<tr>
<td>LIT</td>
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</tr>
<tr>
<td>MAF</td>
<td>none</td>
</tr>
<tr>
<td>MCI</td>
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<tr>
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<td>GRR  MKE  MSN  ORD</td>
</tr>
<tr>
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<td>none</td>
</tr>
<tr>
<td>OAK</td>
<td>none</td>
</tr>
<tr>
<td>OKC</td>
<td>none</td>
</tr>
<tr>
<td>ONT</td>
<td>SNA</td>
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<td>none</td>
</tr>
<tr>
<td>SAN</td>
<td>SNA</td>
</tr>
<tr>
<td>SAT</td>
<td>none</td>
</tr>
<tr>
<td>SDF</td>
<td>CVG  DAY  LEX</td>
</tr>
<tr>
<td>SFO</td>
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</tr>
<tr>
<td>STL</td>
<td>none</td>
</tr>
<tr>
<td>TUL</td>
<td>ICT</td>
</tr>
</tbody>
</table>

Distances are based on air-miles obtained from OD PLUS database developed by Data Base Products, Inc., Dallas, Texas.
APPENDIX B

TECHNICAL NOTE ON O&D DATA
The data used in the study was extracted from the OD PLUS product distributed by Data Base Products, Inc. of Dallas, Texas. OD PLUS is a CD-ROM database derived from the U.S. Department of Transportation's Origin and Destination Survey (O&D Survey). The following discussion is taken from the Data Base Products' support documentation for the OD PLUS database.  

"The O&D Survey data begins with the passenger coupon tickets used for all domestic flights. A ten percent sample of these coupon tickets is recorded by all domestic carriers, according to the industry rules and regulations. This data is reported to the U.S. Department of Transportation each quarter in the carriers' Form 41 Reports.  

The regulations governing airlines are published in the Code of Federal Regulations. These require all "Large Air Carriers" to report the O&D Survey data. "Large Air Carriers" are defined to be: all companies (except helicopter carriers) that meet both of the following criteria. Companies engaged in "Air Transportation" ... [and] companies operating "Large Aircraft", defined as "aircraft designed to have a maximum passenger of more than 60 seats ...  

These Large Carriers are required to maintain records and file reports according to the Code of Federal Regulations, Part 241. The term "Form 41" is frequently used to refer to the reports which are required to be filed. All of the O&D data comes from the Form 41 reports that each carrier files with the D.O.T. The D.O.T. then processes the data and publishes it as their "Origin and Destination Survey" ...
The recording of the data from the sampled flight coupon normally consists of transcribing the information exactly as indicated on the ticket. The detail recorded for each trip shows the complete routing from the origin city ... to the destination city ... including, its sequence from the origin, each point of transfer and stopover, ... the summarized fare-basis code shown for each flight coupon stage of the itinerary, and the total dollar value of the fare and tax for the entire ticket ...

The Survey is collected primarily on the basis of a stratified, scientific sample of at least one percent of tickets in domestic major markets and ten percent of tickets in all other domestic and in all international city-pair markets. The Survey data are taken from the selected flight coupons to the tickets sampled: single-coupon or double-coupon round trips in domestic major markets where the ticket serial number ends in double zero (00) and all other ticket coupons ending in zero (0). This procedure yields a "two-tiered stratified sample" ...

The D.O.T. collects the data from the airlines ... [The D.O.T.'s] processing [of] the data combines various filings submitted in electronic format with data that is keyed in from hard copy filings ...

The D.O.T. edits the data based on its own system of checks. [The D.O.T.] checks the airport codes in the data supplied by the carriers to see that they are valid codes. [The D.O.T.] checks the fare of each coupon for each mileage block to determine if the yield per mile falls within a certain acceptable range. If it exceeds the acceptable limit, it is flagged as a "Bad Fare", assumed to be a data entry error.

The O&D data is then published by the D.O.T. as the "Origin and Destination Survey". The form of the published O&D Survey that Data Base
Products uses as its data sources is the electronic format of Databank 1A (or OD1A) on nine track tape ...

The Department of Transportation Schedule T-100 "Market Reports" ... [also] are part of the Form 41 filing requirements of Large Carriers. They are the source of additional data for [Data Base Products'] Reliability Database. The T-100 Reports contain "On-Flight" O&D data for passenger counts on "enplaned passengers" ... Because the T-100 Reports contain "On-Flight" data, it is exactly comparable to the O&D Survey data when compared per coupon, except the T-100 does not contain "Code Sharing" data, and except for the reliability of reporting. [Data Base Products] uses the T-100 "Enplaned Passengers" Data Element to cross check the passenger counts reported in the O&D Survey data. A very close accounting means that the figures reported have a high degree of reliability.

If there is a large discrepancy, there are two possible explanations. One explanation is that there was a large amount of "Code Sharing" traffic included in the O&D Survey data. Another is that the figures were unreliably reported by someone. To determine which of these is the case requires a knowledge of the extent of "Code Sharing" by that carrier."

After Data Base Products receives the O&D Survey tape from the D.O.T., Data Base Products performs "an independent audit of the data, using [Data Base Products'] own "Fare Filters". This screens out additional "Bad Fares" from the data. The criterion used for determining when a fare is bad is that it is either ridiculously high or ridiculously low. If [Data Base
Products] determines that a fare is a "Bad Fare", [Data Base Products] does not use it in [the] calculations of Average Fare and Yield. [Data Base Products] assumes that the passenger actually took the trip, but that the fare reported was incorrectly entered. Therefore, the "Bad Fare" is not deleted from the data. It is still counted in [the] Passenger Count."

The domestic fare filters used by Data Base Products to screen out "Bad Fares" are shown in Table 60.

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<tr>
<th>Mileage</th>
<th>Yield in Dollars per Mile</th>
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<tbody>
<tr>
<td></td>
<td>Minimum</td>
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<tr>
<td>1-100</td>
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<td>1901+</td>
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</table>

The fares and revenues reported in Data Base Products' OD PLUS database are net of Federal Excise Taxes. Average fares are computed by dividing total revenues by total...
passengers, including zero-fare passengers. Non-revenue passengers, which typically are airline employees, are not counted in the O&D Survey. However, zero-fare passengers, such as passengers traveling on frequent flyer bonuses, are counted in the O&D Survey.

The average length of haul is calculated by dividing the sum of all passenger miles traveled by the number of passengers. Because the O&D Survey does not "indicate a stop where the passenger did not deplane (as in single-plane through service), [the average length of haul derived from the O&D Survey] is not quite the same number as the average length of haul which would be calculated by using revenue passenger miles", but it is a close approximation.
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