

# Delta's New Song: A Case on Cost Estimation in the Airline Industry

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## Delta's New Song: A Case on Cost Estimation in the Airline Industry

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**ABSTRACT:** This case provides the opportunity to use various empirical techniques (i.e., high-low method, simple regression, and multiple regression) in the estimation of cost functions. The case uses the airline industry as the setting for this analysis and, in particular, focuses on the efforts of Delta Airlines to plan for salaries, the cost category that dominates its income statement. The case provides the data and the opportunity to learn the details of cost function estimation, but more importantly, it provides a rich setting in which issues related to the interpretation of these cost functions can be discussed. Finally, the entry of Delta into the low-cost carrier segment with its formation of Song provides a unique opportunity to think about how the cost function of an established full-service airline compares to that of a low-fare startup. Data from successful newcomer JetBlue is used to illustrate these differences. More generally, the case shows how the use of historical costs and cost estimation techniques can facilitate decision making about entry into new product markets.

### INTRODUCTION

Founded in 1924, Delta Airlines is the third largest U.S. airline in operating revenues and revenue passenger miles flown.<sup>1</sup> Traditionally, Delta's primary competition came from the other full-service airlines, including United Airlines and American Airlines. However, in recent years, the major airlines have increasingly been forced to compete with low-cost, no-frill airlines pioneered by "fly for peanuts" Southwest Airlines. The significant downturn in passenger volume in the third quarter of 2001 (following the September 11 attacks) served only to increase the head-to-head competition between the majors and the low-cost competitors.

### AIRLINE LABOR COSTS

#### Industry Challenges

Airlines must operate within a low-margin, high-fixed-cost environment, making profitability particularly sensitive to decreases in volume, either from environmental factors (e.g., the September 11, 2001 attacks) or from competition. Moreover, the airline business is labor-intensive. Labor costs as a percentage of revenues ranges from a low of about 25 percent for the low-fare airlines to almost 50 percent for the large, full-service airlines such as United (see Exhibit 1).

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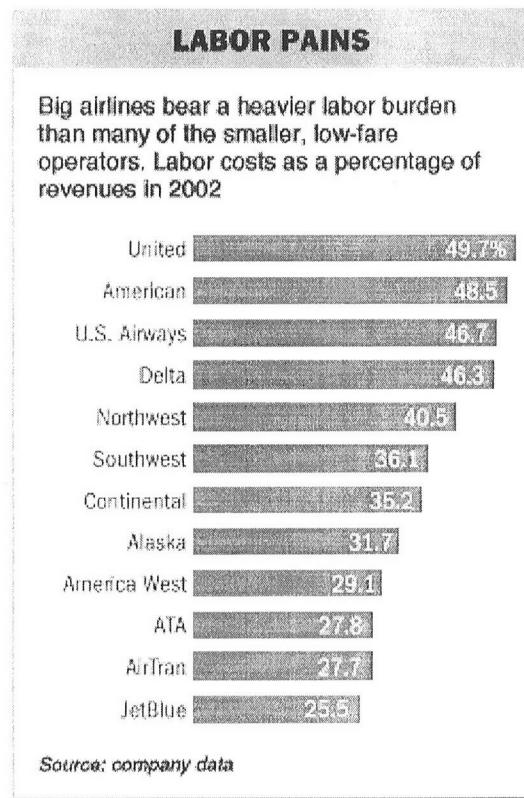
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<sup>1</sup> As of January 2003.

**EXHIBIT 1**  
**Labor Costs in the Airline Industry**



Reproduced from Cary and McCartney (2003).

For many airlines labor unions at various levels of the organization are strong, presenting an additional challenge in the management of costs. Labor union (re)negotiations were on the rise during 2003, as airlines tried to pass along an increasing share of the cost cutting to its employees. In the summer of 2002, US Airways won concessions from its workers corresponding to a 27 percent reduction from its prior year labor costs. Plans to terminate the airline's pilot pension plan, however, met with objections and will likely be resolved in US Airway's bankruptcy hearings. In January of 2003, American Airlines requested an \$8 billion concession from the three labor unions representing its labor force. Northwest similarly argued for salary concessions as part of a \$1 billion cutback (Cary and McCartney 2003).

"Labor costs, especially pilot-labor costs, are on the point of the spear again," Capt. John Prater, chairman of the pilot union at Continental Airlines, recently wrote to his members. "Airline managements, Wall Street, the [Bush] administration and Congress are once again looking for a scapegoat to blame for the industry's ailments; so-called 'high-priced, under-worked' pilots have once again become their primary target." A senior pilot in the industry typically earns about \$250,000 a year, while a senior mechanic would make about \$70,000 and a senior flight attendant about \$40,000. (Cary and McCartney 2003)

## Delta Airlines

With over 81,000 employees, salaries are a significant component of Delta's cost structure, accounting for over 42 percent of the company's total operating expenses and over 46 percent of total revenues in fiscal year 2002 (see Exhibit 2). As with other airlines, Delta pilots and flight attendants are paid for hours flown. Contracts for *unionized* personnel guarantee a certain level of hours to unionized employees (with federal regulations providing caps on the number of hours that can be flown by an individual in a month). As a consequence, salaries are largely fixed in the short term for unionized employees. However, Delta is the *least unionized* of the major airlines. In fact, Delta's pilots are the only unionized employee group (with the exception of a very small contingency of flight operations personnel). Delta's flight attendants and ticket agents are not under union contract; consequently, their salaries, as well as hourly personnel (e.g., ticket counter and ramp operations personnel), represent salaries that are more variable in nature. Moreover, contracted maintenance work creates additional flexibility in salaries costs for Delta.

Since interim wage concessions by pilots of United Airlines (which also filed for bankruptcy protection in December 2002), Delta pilots are the highest paid in the industry with an average hourly wage rate for a Boeing 757 captain of \$245. The same pilot would earn \$178 per hour at Continental Airlines and only \$172 per hour at United (post-concession) (Harris 2003b). In February 2003, the Airline Pilots Association (ALPA) successfully blocked Delta's plan to furlough an additional 1,700 pilots (Delta had already furloughed 1,600 pilots citing September 11 traffic declines as "circumstances beyond its control"). The ALPA, however, argued that the furloughs were in fact the result of the general economic difficulties the industry was experiencing and, therefore, were in violation of ALPA contracts that prohibit layoffs due to the company's economic and financial situation. Delta representatives continue to assert the "continuing need to address overall pilot costs to enable Delta to return to a competitive cost structure and to preserve Delta's long-term future" (Setaishi 2003).

## DELTA'S SONG

In November 2002, Delta Airlines announced that it would form a new low-cost carrier, Song. Song began service on April 15, 2003 with its first flight between John F. Kennedy International Airport in New York and West Palm Beach, Florida (Wong 2003). This was not Delta's first attempt to enter the low-fare market. A previous attempt, Delta Express, was initially profitable but eventually failed because of "a lack of a management team to fight budget wars, cost creep, and brand confusion" (Daniel 2003). Despite this prior unsuccessful attempt to operate a low-cost carrier under the Delta umbrella, Delta asserts its belief that Song will be able to successfully compete in the low-fare industry segment, a segment that has been relatively prosperous amid the industry downturn.

Song operations will be based on the low-cost model of Southwest Airlines (e.g., low fares, low frills, and quick turnarounds) and is targeted to compete with successful newcomer JetBlue. Song will be supported by a single-airliner fleet of 36 Boeing 757s and will provide service to Florida and the East Coast. Like JetBlue, Song flights will feature in-flight entertainment competitive with JetBlue's satellite televisions (Harris 2002).

### Can Delta Succeed Where It Has Failed Before?

Overall, Delta expects cost per available seat mile to be about 20 percent lower for Song than it is for its current operations. John Selvaggio, Delta executive and future Song president indicates that airplane utilization will be increased and pilots and flight attendants will experience "more flying and less sitting time" (Harris 2002). What Delta won't do, however, is pay its Song pilots less than the current Delta pilots. Given that Delta pilots' per hour wage rates are, on average, \$100 more than those of Southwest and JetBlue, industry analysts are skeptical of the ability of Delta to compete in the low-cost carrier segment. "It's very hard for me to see how they can come very close to the costs

## EXHIBIT 2

## Delta Airlines Selected Quarterly Financial Data: 1993-2002<sup>a</sup>

Panel A: 1993–1998

(continued on next page)

## Panel B: 1999–2002 Operating Revenue

## EXHIBIT 2 (continued)

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<sup>a</sup> Data collected from Delta Airlines quarterly SEC filings (see also Delta Airlines website: <http://www.delta.com>).

of JetBlue and Southwest without closing the labor-cost gaps," said Michael Roach, an associate with Unisys R2A Transportation Management Consultants in Hayward, California (Harris 2003a). In fact, Roach estimates that JetBlue and Southwest would still have 10 percent and 30 percent cost advantages, respectively, over Song.

Delta is in a position of evaluating entry into a new product market, namely, the low-cost carrier market. The question is, can Delta succeed where it has failed before? Can the airline create for itself a business model that can compete with the JetBlues and Southwest Airlines of the industry? Moreover, it may be that their options for operational investments are more limited than those of a brand new carrier such as JetBlue, thereby putting Song at a disadvantage. For example, they will be using their current airline fleet and, as a result, will be unable to take advantage of favorable lease terms offered to new carriers (Daniel 2003). The key to success for this endeavor lies in the ability to create a very different cost structure than the one under which it currently operates. Delta must understand how its current costs behave and, more importantly, anticipate how they will behave in the new business model outlined for Song. Can Delta rely on historical data to predict costs into the future for Delta and for Song? Or has the business model (and the environment) changed in such a fundamental way that Delta can no longer assume "business as usual"?

### **SUGGESTED DISCUSSION QUESTIONS**

Use Exhibits 2–4 to address Discussion Questions 1–4.

1. Identify several possible drivers of salary costs for use in estimating a salary cost function. Using one of these cost drivers, apply the high-low technique to estimate the salary cost function for Delta Airlines. What driver did you select and why? How would Delta use this function to forecast costs? What are the advantages of this technique? The disadvantages?
2. Use simple regression to estimate the salary cost function for Delta Airlines. Comment on the statistical validity and significance of your results. What are the advantages of this technique? The disadvantages? Is this technique an improvement over the high-low method? Why or why not?
3. Select several likely drivers of salaries and use multiple regression to estimate the salary cost function for Delta Airlines. What drivers did you select and why? Is this model an improvement over the model estimated in Question 2? What are the advantages of this technique? The disadvantages?
4. Under what conditions do you think the cost functions estimated in Questions 1–3 will be useful for predicting the salaries for Delta in 2003? 2004? Under what conditions would they be less useful? Explain.
5. Use the high-low technique to estimate the salary cost function for JetBlue Airways Corp. Interpret the results. (Use Exhibits 5–6 to address this discussion question.)

Prior to launching Song, Delta has the difficult task of projecting what Song's costs will be. Since Song will compete with the low-fare carriers such as JetBlue and Southwest, this task of estimating and planning for costs is particularly critical to the success of Song. Moreover, since airlines are so labor intensive (recall that labor costs approach 50 percent of revenues for the large airlines), it is important to pay special attention to the forecasting of salaries for Song.

6. What volume (e.g., number of revenue passengers emplaned) do you think Delta can expect for Song in its first year of operations? Make a recommendation regarding how best to estimate the salaries cost for Song in its first year of operation.

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**EXHIBIT 3**  
**Delta Airlines**  
**Excerpts from the Notes to the 2001 Annual Report**

**Note 9. Asset Writedowns and Other Nonrecurring Items**

- A \$566 million charge relating to our decision to reduce staffing across all workgroups due to the capacity reductions we implemented as a result of the September 11 terrorist attacks. We offered eligible employees several options, including voluntary severance, leaves of absence, and early retirement. Approximately 10,000 employees elected to participate in one of the voluntary programs. Involuntary reductions will affect approximately 1,700 employees—up to 1,400 pilots and 300 employees from other workgroups.
- A \$363 million charge resulting from a decrease in value of certain aircraft. This charge includes (1) impairment charges,..., which reflects further reduction in the estimated future cash flows and fair values of these aircraft since our impairment review in 1999 (discussed below) as well as a revised schedule for retiring these aircraft over the next five to nine years, and \$83 million related to the accelerated retirement of 40 B-727 aircraft by 2003; and (2) a \$77 million write-down related to our decision to accelerate the retirement of nine B-737 aircraft in 2002 and a \$12 million writedown to fair market value of 18 L-1011 aircraft which are held for disposal. We recorded \$303 million of these charges as a result of the effects of the September 11 terrorist attacks.
- A \$160 million charge that relates primarily to discontinued contracts, facilities, and information technology projects. It also includes \$9 million related to the write-off of certain receivables that we believe we will not be able to realize as a result of the September 11 terrorist attacks.

**Note 2. September 11, 2001 Terrorist Attacks**

On September 11, 2001, four commercial aircraft were hijacked by terrorists and crashed into The World Trade Center in New York City, the Pentagon in northern Virginia, and a field in Pennsylvania. These attacks resulted in an overwhelming loss of life and extensive property damage. Immediately after the terrorist attacks, the Federal Aviation Administration (FAA) closed U.S. airspace, prohibiting all flights to, from, and within the United States. Airports reopened on September 13, 2001, except for Ronald Reagan National Airport in Washington, D.C., which partially reopened on October 4, 2001.

When flights were permitted to resume, our passenger traffic and yields were significantly lower than before the attacks. Additionally, new security directives required by the FAA increased our costs and reduced our ability to continue our pre-September 11, 2001 schedule. Due to the significant reduction in traffic, we reduced our scheduled network capacity by 16 percent, effective November 1, 2001.

On September 22, 2001, President Bush signed into law the Air Transportation Safety and System Stabilization Act (Stabilization Act), which is intended to preserve the viability of the U.S. air transportation system.

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**EXHIBIT 4**

Delta Airlines

Selected Quarterly Statistical Data: 1993-2002<sup>a</sup>

### Other Statistical Data (in millions, unless otherwise stated)

(continued on next page)

#### EXHIBIT 4 (continued)

<sup>a</sup> A data collected from Delta Airlines quarterly SEC filings (see also Delta Airlines website: <http://www.delta.com>). Revenue passengers are the total number of paying passengers flown on all flight segments. Revenue passenger miles are the number of miles passengers. Available seat miles are the number of seats available for passengers multiplied by the number of miles of aircraft seating capacity that is actually utilized (revenue passenger miles divided by available seat miles).

**EXHIBITS 5**  
**JetBlue Airways Corp.**  
**Selected Quarterly Financial Data, 2001–2002<sup>a</sup>**

Consolidated Statements of Income (in millions)		Operating Expenses	
	Operating Revenues		Expenses
2001 Q1	62	2	\$64
2001 Q2	76	2	\$78
2001 Q3	80	2	\$83
2001 Q4	92	3	\$96
2002 Q1	129	4	\$133
2002 Q2	144	5	\$149
2002 Q3	160	5	\$165
2002 Q4	182	6	\$187
			<b>INCOME (LOSS)</b>
			<b>OPERATING EXPENSES</b>
			<b>Total Operating Expenses</b>
			<b>Other Operating Expenses</b>
			<b>Operating Expenses</b>
			<b>Other Rents and Fees</b>
			<b>Marketing Expenses</b>
			<b>Repairs and Maintenance</b>
			<b>Landling Fees and Other Rents</b>
			<b>Total Operating Expenses</b>

<sup>a</sup> Data collected from JetBlue Airways Corp. quarterly SEC filings (see also JetBlue Airways Corp. website: <http://www.jetblue.com>).

**EXHIBIT 6**  
**JetBlue Airways Corp.**  
**Selected Quarterly Statistical Data, 2001–2002<sup>a</sup>**

Other Statistical Data (in thousands, unless otherwise stated)

	Available Ton Miles	Revenue Miles	Revenue Air Miles	Revenue Miles Flowin	Revenue Miles	Revenue Passen	Revenue Miles per Ton Miles	Revenue Miles per Ton Miles	Revenue Miles per Available Seat Miles	Operating Cost per Available Seat Mile	Operating Cost per Available Ton Mile	Passenger Yield	Passenger Load Factor (%)
2001 Q 1	746.1	74,806	5.3	10.5	4,597	4,606	627.6	599.4	59,938	60,246	\$85.58	\$75.47	\$0.75
2001 Q 2	960.4	97,476	6.3	13.2	5,923	5,929	741.7	764.6	76,460	76,859	\$81.63	\$70.14	\$0.69
2001 Q 3	1178.4	118,098	6.9	15.6	6,976	7,275	782.8	863.1	86,315	86,752	\$70.10	\$66.53	\$0.66
2001 Q 4	1374.9	138,194	7.8	18.6	8,452	8,487	904.3	1,050.2	105,022	105,742	\$69.50	\$66.58	\$0.66
2002 Q 1	1613.5	162,227	9.4	22.3	9,956	9,960	1,169.7	1,302.7	130,270	131,148	\$82.66	\$68.17	\$0.68
2002 Q 2	1930.6	386,215	10.1	26.2	11,921	11,921	1,323.1	1,624.1	1,624.15	163,510	\$77.34	\$62.98	\$0.31
2002 Q 3	2225.8	81,313	11.2	29.5	13,739	13,739	1,452.6	1,886.8	188,678	189,644	\$74.25	\$64.16	\$1.76
2002 Q 4	2469.8	390,278	13.4	33.5	15,210	15,246	1,726.6	2,016.2	201,623	202,610	\$75.82	\$63.09	\$0.40

<sup>a</sup> Data collected from JetBlue Airways Corp. quarterly SEC filings (see also JetBlue Airways Corp. website: <http://www.jetblue.com>). Revenue passengers are the total number of paying passengers flown on all flight segments. Revenue passenger miles are the number of miles flown by revenue passengers. Available seat miles are the number of seats available for passengers multiplied by the number of miles the seats are flown. Load factor is the percentage of aircraft seating capacity that is actually utilized (revenue passenger miles divided by available seat miles).

## CASE LEARNING OBJECTIVES AND IMPLEMENTATION GUIDANCE

### Learning Objectives

#### Intended Audience and Learning Objectives

This instructional case is designed to be used in an introductory management accounting course to illustrate the estimation of cost functions. There are five primary learning objectives of the case. Specifically, following the case, students should be able to:

1. apply (i) the high-low method and (ii) regression analysis to estimate a cost function using historical cost and volume data;
2. interpret a cost function, correctly identifying the fixed cost, variable cost per unit, and total cost;
3. describe the advantages and disadvantages of the two empirical techniques in the estimation of a cost function using historical data;
4. critically evaluate the usefulness for decision making and planning of a cost function estimated with historical data; and
5. describe how historical costs and cost estimation techniques can be used to facilitate decisions regarding entry into new product markets.

The case uses the airline industry as the setting for cost analysis and, in particular, focuses on the efforts of Delta Airlines to plan for salaries, the cost category that dominates its income statement. The case provides the data needed to estimate the salary cost function using various empirical techniques (i.e., high-low method, simple regression, and multiple regression). The instructor can require students to implement these techniques to estimate the salaries cost function. Alternatively, the instructor may provide the estimated cost functions and use class time to compare the models and to discuss their use. Finally, the entry of Delta into the low-carrier segment with its formation of Song provides a unique opportunity to think about how the cost function of an established full-service airline compares to that of a low-fare startup. Data from successful newcomer JetBlue is used to illustrate these differences.

### Case Contribution

The contribution of the case is in the “real-world” application of “text-book” techniques. The case shows how the use of historical costs and cost-estimation techniques can facilitate decision making about entry into new product markets. The case provides a rich setting in which issues related to the interpretation of cost functions can be discussed (e.g., using a cost function outside of its relevant range). Issues arise that force the student to think about the difficulty of applying cost estimation (and other) techniques learned in class to real data. This is in contrast to most textbook problems that provide only the necessary data to address the problem at hand. Many decisions and judgments are required of the students such as the selection of a cost driver to use in the estimation of the cost functions. Unintuitive results force students to think about the underlying and often limiting assumptions of analytical techniques they learn in their business curriculum. The intent is that they will be able to carry with them to topics covered in other courses (e.g., net present value analysis) the critical eye needed to effectively evaluate empirical techniques, their applications, and their results.

### Implementation Guidance

#### Case Administration

If the case is administered following course coverage of cost function estimation techniques, the discussion questions can be assigned prior to the class session in which the case will be discussed. This will allow the case to be presented in a relatively relaxed manner and provide ample opportunity for the discussion of the interpretation and potential usefulness of the cost functions estimated. This case has been successfully used in this manner within a 75-minute class session.

Alternatively, the case can be introduced in class as a *vehicle* through which cost-estimation techniques can be taught. In the latter, no advanced preparation on the part of the students is required. This case has been successfully used in this manner within a 75-minute class session by omitting *Discussion Questions 5 and 6* (i.e., the comparison of Delta to JetBlue). Note that even with the omission of Discussion Questions 5 and 6, relatively little time is available for evaluating the cost functions since the details of cost estimation must be explained. Of course, the extent to which this is true depends on the instructor's objectives with respect to the students' ability to implement the various empirical techniques related to cost function estimation.

Regardless of whether the case is assigned ahead of time or introduced in class, the case will be most effective following a discussion of *why* we want to know how costs behave and to be able to predict them. Namely, cost estimation and prediction are important for the following tasks:

- Preparing a budget
- Planning operations
- Determining breakeven
- Evaluating capital investments
- Evaluating strategic decisions (e.g., entry into new product market)

Finally, if desired, background reading from the accounting academic literature can be assigned prior to the class: Banker and Johnston (1993) empirically investigate cost drivers in the U.S. airline industry in the early 1990s, and Behn and Riley (1999) examine in the U.S. airline industry leading indicators that predict future financial performance of airlines.

### ***Classroom Experience***

Students typically react favorably to the case and seem interested in the industry. They enjoy discussing their own experiences with various airlines and the turmoil the industry has experienced both before and after September 11, 2001. Comments from students, both verbal and in written evaluations, indicate that they appreciate the opportunity to learn the topic of cost estimation using a company and industry with which they are familiar. In subsequent assignments, students were quite able to implement, on their own, the techniques learned in the case and effectively interpret their findings.

### ***Case Validation***

This case has successfully been used in undergraduate management accounting courses comprised of both accounting and nonaccounting majors, and in the introductory M.B.A. course at a large university. A questionnaire administered to 77 students collected opinions regarding, for example, the extent to which the case helped the student in understanding how to apply the different empirical techniques and the relative advantages/disadvantages of the techniques. The questionnaire was administered immediately following the class session in which the case was discussed. The students' responses were anonymous so they felt no pressure to respond favorably to the questionnaire. On a scale of 1–10 (with 10 being the most "helpful"), the mean (median) responses on these two questions were 6.8 (7.0) and 6.7 (7.0), indicating that students believed the case did, in fact, meet its stated objectives. In addition, 84 percent of the students surveyed indicated that they would recommend the case to other instructors at other universities. One student noted, "[the case] was very helpful and allows students to look at real-world problems and apply what was learned in class."

### **TEACHING NOTES**

Teaching Notes are available through the American Accounting Association's new electronic publications system at <http://aaahq.org/ic/browse.htm>. Full members can use their personalized usernames and passwords for entry into the system where the Teaching Notes can be reviewed and printed.

If you are a full member of AAA and have any trouble accessing this material please contact the AAA headquarters office at [office@aaahq.org](mailto:office@aaahq.org) or (941) 921-7747.

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