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

Shane S. Dikolli and Karen L. Sedatole

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.¹ 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

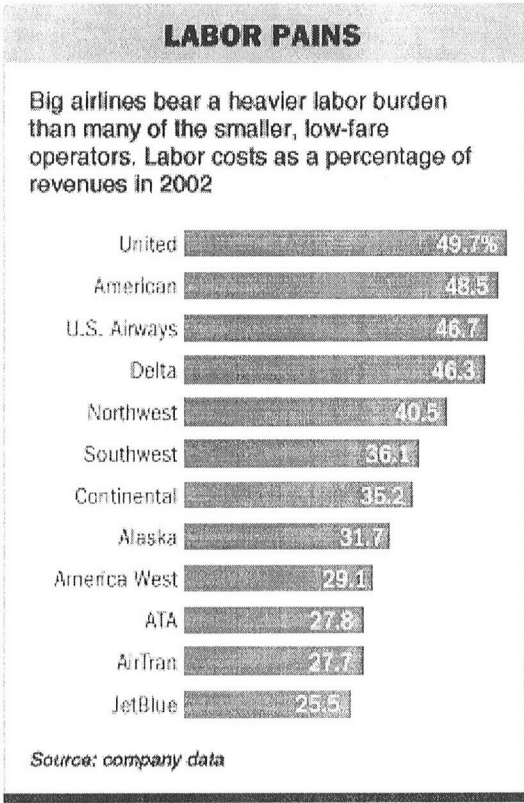
Airlines must operate within a low-margin, high-fixed-cost environment, making profitability particularly sensitive to decreases in volume, either from environmental factors (e.g., the September 11, 2001 attacks) or from competition. Moreover, the airline business is labor-intensive. Labor costs as a 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).

Shane S. Dikolli is an Assistant Professor and Karen L. Sedatole is an Assistant Professor, both at The University of Texas at Austin.

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¹ 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^a

Panel A: 1993–1998

Consolidated Statements of Income (in millions)

Operating Revenues				Operating Expenses														OPERATING INCOME (LOSS)		
Passenger	Cargo	Other, net	Total operating revenues	Salaries & related costs	Aircraft fuel	Passenger commissions	Aircraft Rent	Depreciation & amortization	Selling expenses	Passenger service	Contracted services	Aircraft maintenance & repairs	Facilities and other rent	Landing fees	Restructuring charge	Asset write-downs	Stabilization Act		Other	Total operating expenses
1993 Q1	2,709	168	49	\$2,927	1,200	366	298	184	195	127		122	89	63	83			410	\$3,137	(\$211)
1993 Q2	2,897	177	57	\$3,132	1,205	383	326	186	160	131		104	87	67	(1)			458	\$3,107	(\$429)
1993 Q3	2,942	129	67	\$3,138	1,161	383	311	190	166	139	140	114	105	92	69			146	\$3,016	\$122
1993 Q4	2,742	206	69	\$3,017	1,145	372	315	187	172	131		98	94	61	112			509	\$3,197	\$180
1994 Q1	2,691	187	65	\$2,943	1,145	331	311	182	170		127	102	98	64				482	\$3,010	(\$67)
1994 Q2	2,941	247	74	\$3,261	1,138	325	381	173	170	(139)	133	(114)	113	97	67	414		826	\$3,583	(\$682)
1994 Q3	2,933	138	86	\$3,157	1,138	362	322	172	164	150	137	116	111	102	73			156	\$3,003	\$154
1994 Q4	2,688	154	77	\$2,919	1,074	357	298	172	155	165	118	122	112	110	60			158	\$2,901	\$18
1995 Q1	2,685	134	83	\$2,902	1,102	321	285	171	147	172	92	155	109	110	65			133	\$2,862	\$40
1995 Q2	3,013	139	64	\$3,216	1,040	330	290	156	156	131	96	163	98	114	68			125	\$2,767	\$449
1995 Q3	2,977	129	82	\$3,188	1,037	348	278	140	161	145	104	172	109	113	69			126	\$2,802	\$386
1995 Q4	2,731	135	78	\$2,944	1,051	355	246	139	159	150	91	163	102	109	56			154	\$2,775	\$169
1996 Q1	2,774	126	64	\$2,964	1,077	365	241	138	156	159	87	187	88	82	59	556		156	\$3,351	(\$387)
1996 Q2	3,134	131	94	\$3,359	1,041	396	277	138	158	140	86	182	77	75	64	273		157	\$3,064	\$295
1996 Q3	3,170	124	138	\$3,432	1,092	416	278	137	166	179	105	199	108	99	64			151	\$2,994	\$438
1996 Q4	2,925	145	127	\$3,197	1,107	466	237	137	174	149	94	182	103	92	62			167	\$2,970	\$227
1997 Q1	3,160	142	118	\$3,420	1,118	444	250	136	180	172	92	179	106	99	63	52		183	\$3,074	\$346
1997 Q2	3,250	143	148	\$3,541	1,127	397	251	137	190	177	98	191	117	96	67			174	\$3,022	\$519
1997 Q3	3,260	143	150	\$3,553	1,204	409	266	137	198	164	111	172	124	169				168	\$3,122	\$431
1997 Q4	3,133	160	141	\$3,434	1,206	409	235	137	211	170	105	169	126	153				181	\$3,102	\$332
1998 Q1	3,118	138	133	\$3,389	1,179	342	229	137	218	172	107	212	126	99	58			174	\$3,053	\$336
1998 Q2	3,669	141	(129)	\$3,681	1,261	347	250	141	233	94	127	141	119	(99)	269			203	\$3,086	\$595
1998 Q3	3,487	139	176	\$3,802	1,237	339	252	145	218	196	133	183	143	179				225	\$3,250	\$552
1998 Q4	3,135	150	163	\$3,448	1,217	351	208	146	233	179	124	193	138	164				175	\$3,128	\$320

(continued on next page)

EXHIBIT 2 (continued)

Panel B: 1999–2002

Operating Revenues				Operating Expenses														OPERATING INCOME (LOSS)			
Passenger	Cargo	Other, net	Total operating revenues	Salaries & related costs	Aircraft fuel	Passenger commissions	Aircraft Rent	Depreciation & amortization	Selling expenses	Passenger service	Contracted services	Aircraft maintenance & repairs	Facilities and other rent	Landing fees	Restructuring charge	Asset write-downs	Stabilization Act		Other	Total operating expenses	
1999 Q1	3,203	134	167	\$3,504	1,268	316	191	146	241	192	113	190	134	176					181	\$3,148	\$356
1999 Q2	3,860	134	(151)	\$3,843	1,271	354	216	153	269	74	130	206	146	188					194	\$3,201	\$642
1999 Q3	3,593	140	96	\$3,829	1,306	367	203	154	263	160	133	213	166	180		149			199	\$3,493	\$336
1999 Q4	3,293	153	261	\$3,707	1,349	384	174	169	284	200	122	215	148	179		320			179	\$3,723	(\$16)
2000 Q1	3,589	141	230	\$3,960	1,428	434	169	185	297	198	102	228	171	188					205	\$3,605	\$355
2000 Q2	4,401	145	(154)	\$4,392	1,514	461	176	186	302	86	114	237	196	195		86			226	\$3,779	\$613
2000 Q3	4,050	141	154	\$4,345	1,514	533	164	183	281	190	134	239	184	199		22			192	\$3,835	\$510
2000 Q4	3,617	156	271	\$4,044	1,515	541	152	187	307	214	120	262	172	189					226	\$3,885	\$159
2001 Q1	3,598	140	104	\$3,842	1,607	514	141	188	324	179	114	257	187	198					248	\$3,957	(\$115)
2001 Q2	3,537	131	108	\$3,776	1,560	463	144	186	331	165	127	253	193	192		60			216	\$3,890	(\$114)
2001 Q3	3,190	116	92	\$3,398	1,534	472	137	183	318	152	124	248	216	198		68	(171)		170	\$3,649	(\$251)
2001 Q4	2,639	119	105	\$2,863	1,423	368	118	180	310	120	101	258	205	192		991	(463)		182	\$3,985	(\$1,122)
2002 Q1	2,878	111	114	\$3,103	1,501	339	107	178	281	145	94	263	185	203					202	\$3,538	(\$435)
2002 Q2	3,217	109	148	\$3,474	1,563	401	89	179	291	140	98	241	181	211		23			184	\$3,601	(\$127)
2002 Q3	3,165	112	143	\$3,420	1,555	468	72	175	289	141	95	256	182	213		225	(34)		168	\$3,805	(\$385)
2002 Q4	3,061	126	121	\$3,308	1,546	475	54	177	287	113	85	243	163	207	(40)	191			169	\$3,670	(\$362)

^a 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.

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.

EXHIBIT 4
Delta Airlines
Selected Quarterly Statistical Data, 1993–2002^a

Other Statistical Data (in millions, unless otherwise stated)

	Available Seat Miles	Available Ton Miles	Number of Departures (thousands)	Revenue Air Hours (thousands)	Revenue Miles Flown	Revenue Miles Scheduled	Revenue Passengers Emplaned	Revenue Passenger Miles	Revenue Ton Miles	Revenue Ton Miles	Operating Rev- enue per Avail- able Seat Mile	Operating Cost per Available Seat Mile	Operating Cost per Avail- able Ton Mile	Passenger Mile Yield	Passenger Load Factor (%)
1993 Q1	24.6	3,196	230.9	341.5	144	147	17.9	14.0	1,402	1,580	\$118.97	\$127.54	\$0.98	\$193.23	56.99
1993 Q2	25.1	3,263	236.5	344.8	148	148	19.8	15.5	1,547	1,728	\$124.55	\$123.55	\$0.95	\$187.28	61.51
1993 Q3	25.5	3,318	236.6	345.1	149	150	20.6	16.5	1,645	1,822	\$123.00	\$118.22	\$0.91	\$178.83	64.48
1993 Q4	24.6	3,228	229.9	339.7	145	146	20.1	15.5	1,550	1,747	\$122.67	\$129.99	\$0.99	\$176.96	63.01
1994 Q1	23.8	3,132	223.6	333.2	142	145	19.0	14.7	1,468	1,647	\$123.43	\$126.25	\$0.96	\$183.28	61.58
1994 Q2	24.5	3,226	228.7	338.1	145	146	20.9	16.1	1,607	1,788	\$133.02	\$146.14	\$1.11	\$182.99	65.55
1994 Q3	24.9	3,283	230.5	340.1	147	148	21.5	16.9	1,686	1,856	\$126.60	\$120.43	\$0.91	\$173.98	67.60
1994 Q4	24.8	3,268	230.1	341.7	147	148	20.8	15.8	1,584	1,775	\$117.67	\$116.95	\$0.89	\$169.73	63.84
1995 Q1	24.5	3,217	226.5	339.4	145	147	19.5	15.1	1,505	1,677	\$118.32	\$116.69	\$0.89	\$178.36	61.38
1995 Q2	25.0	3,251	226.0	340.7	147	148	20.4	15.9	1,592	1,759	\$128.45	\$110.52	\$0.85	\$189.27	63.58
1995 Q3	25.2	3,276	225.8	339.0	148	149	20.3	16.3	1,631	1,793	\$126.26	\$110.97	\$0.86	\$182.49	64.61
1995 Q4	25.1	3,260	223.0	341.2	147	148	20.4	15.9	1,594	1,772	\$117.17	\$110.44	\$0.85	\$171.33	63.44
1996 Q1	25.3	3,291	218.6	345.9	147	152	21.2	16.8	1,678	1,839	\$117.03	\$132.31	\$1.02	\$165.35	66.24
1996 Q2	26.3	3,418	224.9	352.4	153	154	23.3	18.6	1,856	2,029	\$127.89	\$116.65	\$0.90	\$168.85	70.66
1996 Q3	26.8	3,486	226.8	357.0	156	157	23.6	19.3	1,930	2,101	\$128.06	\$111.72	\$0.86	\$164.22	72.03
1996 Q4	27.0	3,510	229.4	365.7	157	159	23.2	18.3	1,827	2,026	\$118.25	\$109.85	\$0.85	\$160.11	67.57
1997 Q1	27.0	3,509	228.3	369.2	157	159	23.2	18.5	1,852	2,036	\$126.57	\$113.76	\$0.88	\$170.65	68.53
1997 Q2	27.5	3,573	232.2	372.9	160	161	25.1	20.0	2,003	2,191	\$128.93	\$110.03	\$0.85	\$162.27	72.92
1997 Q3	28.0	3,652	234.8	375.2	163	165	24.8	20.3	2,033	2,223	\$126.88	\$111.49	\$0.85	\$160.37	72.59
1997 Q4	27.8	3,623	233.2	378.4	162	164	24.1	18.9	1,890	2,094	\$123.69	\$111.73	\$0.86	\$165.74	68.09

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EXHIBIT 4 (continued)

	Available Seat Miles	Available Ton Miles	Number of Departures (thousands)	Hours Revenue Air (thousands)	Revenue Miles Flown	Revenue Miles Scheduled	Revenue Passengers Emplaned	Revenue Passenger Miles	Revenue Passenger Ton Miles	Revenue Ton Miles	Operating Rev- enue per Avail- able Seat Mile	Operating Cost per Available Seat Mile	Operating Cost per Avail- able Ton Mile	Passenger Mile Yield	Passenger Load Factor (%)
1998 Q 1	27.1	3,537	227.8	372.3	158	161	23.3	18.4	1,844	2,030	\$125.19	\$112.78	\$0.86	\$169.10	68.11
1998 Q 2	27.3	3,568	230.5	373.2	160	162	25.8	20.6	2,056	2,241	\$134.84	\$113.05	\$0.86	\$178.47	75.31
1998 Q 3	27.8	3,627	229.5	376.0	163	167	24.2	19.8	1,975	2,156	\$136.94	\$117.06	\$0.90	\$176.52	71.15
1998 Q 4	27.9	3,650	229.4	380.8	164	166	24.0	19.1	1,914	2,106	\$123.39	\$111.94	\$0.86	\$163.76	68.51
1999 Q 1	27.4	3,587	224.7	377.7	161	166	23.7	19.2	1,917	2,096	\$127.90	\$114.91	\$0.88	\$167.10	69.97
1999 Q 2	28.1	3,698	228.9	383.5	165	168	25.7	20.8	2,083	2,258	\$136.71	\$113.87	\$0.87	\$185.30	74.11
1999 Q 3	28.5	3,773	228.5	381.4	167	170	25.2	20.9	2,093	2,267	\$134.28	\$122.49	\$0.93	\$171.68	73.39
1999 Q 4	28.5	3,846	229.0	387.4	167	170	24.1	19.4	1,938	2,139	\$130.16	\$130.72	\$0.97	\$169.91	68.05
2000 Q 1	28.1	3,902	224.5	384.8	165	171	23.6	19.1	1,914	2,099	\$140.78	\$128.16	\$0.92	\$187.50	68.05
2000 Q 2	28.5	3,952	225.8	386.4	167	171	26.4	21.8	2,179	2,369	\$154.22	\$132.69	\$0.96	\$201.97	76.51
2000 Q 3	28.8	4,029	225.6	387.3	170	173	25.2	21.7	2,166	2,344	\$150.70	\$133.01	\$0.95	\$186.98	75.13
2000 Q 4	28.1	3,922	223.6	387.5	166	175	23.2	19.2	1,922	2,116	\$144.05	\$138.39	\$0.99	\$188.15	68.48
2001 Q 1	27.3	3,841	219.6	381.7	162	169	22.0	18.2	1,821	1,988	\$140.53	\$144.74	\$1.03	\$197.58	66.61
2001 Q 2	28.0	3,936	225.5	387.8	167	172	24.4	20.1	2,012	2,177	\$134.68	\$138.74	\$0.99	\$175.78	71.77
2001 Q 3	27.1	3,819	214.7	373.2	163	174	21.9	19.0	1,899	2,044	\$125.28	\$134.53	\$0.96	\$167.99	70.01
2001 Q 4	24.7	3,507	196.1	338.3	147	148	18.9	15.9	1,588	1,709	\$116.13	\$161.64	\$1.14	\$166.17	64.42
2002 Q 1	24.5	3,501	196.9	341.6	146	148	19.8	16.7	1,674	1,808	\$126.65	\$144.40	\$1.01	\$171.92	68.33
2002 Q 2	25.3	3,622	202.5	348.1	150	152	21.6	18.3	1,829	1,975	\$137.32	\$142.34	\$0.99	\$175.87	72.31
2002 Q 3	25.6	3,674	202.5	346.8	152	153	21.7	18.8	1,877	2,008	\$133.62	\$148.66	\$1.04	\$168.58	73.35
2002 Q 4	24.5	3,524	177.0	322.2	140	141	21.0	17.6	1,760	1,906	\$135.19	\$149.98	\$1.04	\$173.96	71.91

^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 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).

EXHIBIT 5
JetBlue Airways Corp.
Selected Quarterly Financial Data, 2001–2002^a

Consolidated Statements of Income (in millions)

	Operating Revenues			Operating Expenses									
	Passenger Revenues	Other Operating Revenues	Total Operating Revenues	Salaries, Wages, and Benefits	Aircraft Fuel	Aircraft Rent	Depreciation and Amortization	Sales and Marketing	Maintenance and Repairs	Landing Fees and Other Rents	Other Operating Expenses	Total Operating Expenses	OPERATING INCOME (LOSS)
2001 Q 1	62	2	\$64	16	9	6	2	6	1	6	12	\$56	\$8
2001 Q 2	76	2	\$78	19	11	8	2	6	1	6	14	\$67	\$11
2001 Q 3	80	2	\$83	22	12	9	3	7	2	8	16	\$78	\$4
2001 Q 4	92	3	\$96	28	11	10	3	9	2	8	21	\$92	\$4
2002 Q 1	129	4	\$133	34	13	9	5	10	2	10	28	\$110	\$23
2002 Q 2	144	5	\$149	38	17	10	6	12	2	10	28	\$122	\$28
2002 Q 3	160	5	\$165	42	21	10	7	12	3	12	37	\$143	\$22
2002 Q 4	182	6	\$187	49	25	11	10	11	3	12	35	\$156	\$31

^a 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^a

	Other Statistical Data (in thousands, unless otherwise stated)										Operating Revenue per Available Seat	Operating Cost per Available Seat	Operating Cost per Available Ton Mile	Passenger Mile Yield	Passenger Load Factor (%)
	Available Seat Miles	Available Ton Miles	Number of Departures	Revenue Air Hours	Revenue Miles Flown	Revenue Scheduled Miles	Revenue Passengers	Revenue Passengers	Revenue Passenger Miles	Revenue Passenger Miles					
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	\$103.38	80.33
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	\$99.60	79.61
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	\$93.00	73.25
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	\$87.70	76.39
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	\$99.10	80.74
2002 Q 2	1930.6	386,215	10.1	26.2	11,921	11,921	1,323.1	1,624.1	162,415	163,510	\$77.34	\$62.98	\$0.31	\$88.84	84.13
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	\$84.93	84.77
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	\$90.04	81.64

^a 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@aaaahq.org or (941) 921-7747.

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