UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF NORTH CAROLINA
CHARLOTTE DIVISION
CIVIL ACTION NO.____________

US AIRWAYS, INC., Plaintiff, v. US AIRLINE PILOTS ASSOCIATION and MICHAEL J. CLEARY, Defendants.	**EXPERT REPORT OF DARIN N. LEE, PH.D. IN SUPPORT OF PLAINTIFF'S MOTION FOR PRELIMINARY INJUNCTION**

I. IDENTIFICATION & ASSIGNMENT

1. I am a Senior Vice President in the Boston, MA office of Compass Lexecon and specialize in the economics of the airline industry, industrial organization, labor economics and auctions. My business address is 200 State Street, 9th Floor, Boston, Massachusetts, 02109. I have over 13 years of experience providing expert consulting services to numerous domestic and international airlines, industry trade associations and labor organizations on a wide variety of economic and statistical matters involving the airline industry including labor disputes, bankruptcy reorganization, mergers, alleged anti-competitive behavior, alliances and antitrust immunity, seniority integration and business interruption matters. I have published numerous empirical articles on various aspects of airline economics (including operational performance) in peer-reviewed, academic journals such as *The Journal of Law & Economics*, the *Journal of Labor Economics*, the *Review of Industrial Organization* and the *Journal of Competition Law & Economics.* I am also editor of the *Advances in Airline Economics* book series, a collection of scholarly research papers on various aspects of airline economics published by Elsevier.

2. I have testified as an expert on the airline industry in federal court and before numerous arbitration boards. I have also filed testimony before the U.S. Department of Transportation on matters related to the economics of the airline industry and have presented empirical analyses regarding various aspects of the airline industry before the U.S. Department of Justice and the Canadian Competition Bureau.

3. I received my Ph.D. in Economics from Brown University in 1998 and also hold an M.A. in Economics from Queen's University in Kingston, Ontario and a B.Sc. in Economics from the University of Victoria, Canada. I have taught graduate level courses in economics at the University of Colorado-Denver. My *curriculum vitae* is attached to this report as Appendix A.

4. I have been retained by US Airways, Inc. ("US Airways" or "the Company") to provide an independent statistical analysis of the increase in various pilot behaviors that the Company has experienced since May 1, 2011 and to determine the likelihood that the elevated level of these behaviors could have been the result of random statistical variation. I have also been asked to provide a statistical assessment of the likelihood that the deterioration in the Company's operational performance since May 1st could have been the result of random chance. Finally, I have been asked to ascertain the extent to which erosion in the Company's operational performance has harmed the Company and its passengers.

5. This report contains a statement of my opinions as well as the bases for those opinions, and is supported by the work that I have performed or supervised to date. The opinions set forth in this report are based upon my review and analysis of: (i) relevant documents and data in this matter as provided to me by counsel and the Company; (ii) relevant publicly available information and airline data sources

including the Official Airline Guide ("OAG") schedule database and the U.S. DOT's Domestic Survey of Origin and Destination passengers ("DB1B"); (iii) conversations with Company officials; and (iv) my own knowledge and experience from working with and conducting academic research on the aviation industry.[1] My investigation and consideration of the issues in this matter are ongoing. Accordingly, my opinions are subject to revision based on the work I may complete in the future and further documents, data, testimony, and other materials I may review. My professional fees for this matter are $575 per hour.

II. SUMMARY OF OPINIONS

6. Based on my review of the relevant issues, data and documents in this matter to date, I have formed the following opinions:

- Starting on or around May 1, 2011, several measures of pilot behavior began to exhibit significant increases among US Airways' "East" pilots (those based at Charlotte ("CLT"), Philadelphia ("PHL") and Washington National ("DCA") who were part of US Airways prior to its 2005 merger with America West Airlines). These pilot behavior measures include the frequency of pilot maintenance write-ups, pilot fatigue calls, pilot induced flight delays and prolonged aircraft taxi times. The increase in each of these pilot behavior metrics since May 1st, 2011 is well in excess of what

[1] A list of documents and information sources considered is provided as Appendix B.

conventional statistical analysis would consider to be “random” occurrences when compared to a historical control period.

- For example, for the week ending July 26, 2011, the number of pilot maintenance write-ups as a percentage of flights for the Company’s East operations was 33.48% compared to the historical (i.e., January 1, 2008 to March 31, 2011) average weekly rate of 23.56%.[2] Based on my analysis and application of standard statistical tests, the probability that one would observe a maintenance write-up rate of this magnitude is 0.00013%, or approximately one-in-800,000. Moreover, a similar analysis of pilot write-ups by the Company’s “West” pilots (those based in Phoenix who were formerly employees of America West prior to the 2005 merger) indicates no such anomaly.
- Likewise, the proportion of East mainline flights delayed due to pilot actions surged to more than twice its historical average since May 1st (from 1.31% to 2.85%), but has remained well within historical norms for the Company’s West pilots. This increase in the rate of pilot delays relative to its historical average has resulted in more than 1,100 additional East flight delays since May 1st.
- Similarly, prior to May 2011 there were on average fewer than seven East pilot fatigue calls per month. In May, June and the first 25 days of July of this year, however, there were 17, 19 and 12 fatigue calls by East pilots

[2] Throughout the remainder of my report, I will refer to the period from January 1, 2008 to March 31, 2011 as the “historical” period.

respectively. The probability that the level of fatigue calls observed in May, June and July of this year could have been the result of random statistical variation is less than 0.26%, 0.03% and 1.98% respectively.

- Likewise, starting on or around May 1, 2011, the Company experienced a significant increase in aircraft taxi times on flights operated by "East" pilots. For example, since May 1st, 2011 US Airways' East "taxi-out" and "taxi-in" times increased by 0.90 and 0.63 minutes, respectively, after controlling for other factors that influence taxi times such as weather conditions and the number of US Airways' operations each day.[3] In aggregate, slower taxiing by East pilots has resulted in over 1,900 additional hours of taxi time for the Company's East fleet.

- Because of the statistically significant increase in several measures of pilot behavior (isolated among its East pilots), the reliability of US Airways' East operations has been adversely affected, imposing significant costs on the Company and causing substantial inconvenience for US Airways' passengers. For example, a regression model controlling for daily weather variation and other factors, indicates that pilot actions since May 1st have added more than six minutes of delay (on average) to East mainline and Charlotte mainline flights. In aggregate, this has resulted in over 8,000 hours of East flight delays since May 1st. Moreover, when this model is

[3] The "taxi-out" time is the time from when an aircraft's parking brake is released until the aircraft takes off. The "taxi-in" time is the time from when an aircraft lands until its parking brake is engaged.

applied to the Company's West mainline and Express operations (those performed by US Airways' regional carrier partners), no statistically significant change is found.

- A similar regression analysis (also controlling for weather and other factors) indicates that East pilot actions since May 1, 2011 have resulted in a nearly 11 percentage point degradation in the percentage of the Company's East operations that arrived within 14 minutes of their scheduled arrival time (historically, approximately 79% of US Airways' East flights arrived on-time by this metric). Put differently, this has resulted in over 8,000 additional East mainline flight delays since May 1st. In Charlotte, the impact has been even larger, at 12 percentage points (resulting in approximately 2,500 flight delays since May 1st). This metric, known throughout the industry as "A:14" is used by the U.S. Department of Transportation to compare on-time performance across carriers. Moreover, when this model is applied to the Company's West mainline and Express operations, no statistically significant change is found.
- Moreover, a regression analysis (once again controlling for weather and other factors) indicates that East pilot actions since May 1, 2011 have resulted in more than one percent of all East flights being cancelled. This represents, on average, nine to ten cancellations per day, which—based on US Airways' average number of passengers per East mainline flight—has impacted approximately 1,173 passengers per day, *or more than 105,000*

passengers since May 1st, 2011. Once again, when this model is applied to the Company's West mainline and Express operations, no statistically significant change is found.

- The erosion in the Company's operational performance that has occurred since May 1, 2011 has resulted in a substantial deterioration in US Airways' operational performance relative to those of its large network carrier peers.[4] Over the past several years, US Airways invested substantial resources into improving its operational performance, including the establishment of a "Triple Play Program" that provides $50 cash bonuses to the bulk of its employees for each first place ranking the Company achieves each month in three DOT operational performance metrics.[5] As a result, in 2010 US Airways ranked first among large network carriers in certain areas of operational performance (including departure performance and the fewest mishandled bags) and was also rated the highest in terms of service quality (among the large network carriers) by an annual independent study of airline quality conducted at Purdue and Wichita State universities.[6] Since strong operational performance has become an important competitive

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[4] I define the set of US Airways' large network carrier peers as United, Continental (prior to its merger with United), American, Delta and Northwest (prior to its merger with Delta).

[5] These metrics include A:14, mishandled bags and customer complaints. See *Declaration of Kerry F. Hester in Support of Plaintiff's Motion for Preliminary Injunction*, paragraph 15.

[6] See Airline Quality Rating—2011, Brent Bowen and Dean Headley, Department of Aviation Technology, Purdue University and Department of Marketing, Wichita State University.

advantage for US Airways, actions by pilots to lessen or eliminate this competitive advantage directly harms the Company.

- Applying the findings from a published academic study on the impact of arrival delays on a carrier's average fares, I estimate that each incremental minute of arrival delay across all East flights attributable to pilot job actions is equivalent to more than $53,000 ***per day*** in forgone passenger revenue.[7] I also estimate that pilot job actions have resulted in an average of nearly six and a half minutes of additional delay per East flight. Consequently, should the current level of disruption continue, I estimate that the harm to the Company in terms of forgone passenger revenues would be approximately $348,000 per day.

- Moreover, the Company has incurred substantial additional costs as a result of the deterioration in its operational performance. For example, I estimate that prolonged taxi times that US Airways has been experiencing for its East operations cost the Company approximately $19,000 per day (or more than $1.7 million since May 1st) due to added fuel consumption, wages and engine maintenance costs. Likewise, added passenger compensation and baggage delivery costs as a result of the increased number of checked bags failing to make their connections due to pilot actions are approximately $10,000 per day (or more than $856,000 since May 1st).

[7] This study finds that each incremental minute of delay relative to the average reduces a carrier's average fares by $1.42 for non-stop flights and $0.77 for connecting flights. See "The Effect of Air Traffic Delays on Airline Prices", Silke Forbes, *International Journal of Industrial Organization*, Volume 26(5), September 2008, pp. 1,216-1,232.

- In aggregate, the harm to US Airways from these sources of additional costs and forgone revenue alone—should the current level of pilot job actions persist—amount to approximately $377,000 per day.
- The dramatic increase in each of the behaviors discussed above among US Airways' East pilots coincides with a letter sent on May 4, 2011 by the USAPA Safety Committee to all pilots entitled "Safety Committee Operational Guidance."[8] This letter encouraged pilots to take several actions, including refusing aircraft or requiring immediate maintenance of items typically deferred for scheduled (e.g., overnight) maintenance,[9] calling in fatigued if they are unsatisfied with their layover hotel quality,[10] and prolonging pre-flight checks.[11] Likewise, the statistically abnormal level in pilot maintenance write-ups coincides with USAPA calling for the

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[8] "Safety Committee Operational Guidance", USAPA.

[9] "We innately know when we should accept an MEL and when we should not. What we do not do is follow through with that thought process and make the hard call to make them fix the aircraft or replace it with one that is fixed…We simply have to force this company to maintain these aircraft correctly by refusing them when our extensive experience tells us to do so." *Ibid*, page 6.

[10] "Should you find yourself in a substandard layover hotel, it is incumbent upon you to attempt to get the rest you need. If you cannot, then it becomes your responsibility to either delay the ensuing flight until you feel rested, or inform the Company that they will need to find another pilot to fly your flight because of your fatigue… When enough of our pilots fully understand this requirement, and more importantly, act upon this requirement, then our substandard hotel situation will disappear with a speed you likely thought was not possible." *Ibid*, page 3.

[11] "…close the flight deck door and ensure that it will remain closed until you have completed your pre-flight checks. Once that is complete, open the door. Any issues that have arisen while you were doing your sterile cockpit pre-flight duties can be handled once the flight deck is set up and ready to go." *Ibid*, page 1.

termination of the Company's Vice President of Safety and Regulatory Compliance on May 9, 2011.[12]

- Moreover, the increase in operational disruptions that have occurred since May 1, 2011 also coincides with numerous communications between USAPA pilots encouraging actions aimed at disrupting the Company's operations. For example, an e-mail dated April 25, 2011 from a USAPA pilot to "every East pilot" encouraged them to implement a "Safety First" campaign on May 1, 2011.[13] The e-mail encouraged East pilots to use numerous tactics including slow taxiing of the aircraft,[14] calling in sick or fatigued,[15] and a host of other "safety initiatives" aimed disrupting the Company's operations.[16] Indeed, the e-mail states "*We must prove that we are willing to endure a summer of inconvenience in exchange for decent wages and safe working conditions.*"[17] Moreover, an anonymous posting by "thecaptain.safetyfirst@hotmail.com" on a Yahoo message board dated

[12] See "US Airways Pilots Speak Out About Safety Conditions at the Airline", May 9, 2011, available at: http://usairlinepilots.org/index.php?option=com_content&view=article&id=8022:us-airways-pilots-speak-out-about-safety-conditions-at-the-airline&catid=271:press-releases&Itemid=331.

[13] See Exhibit 13 to *Declaration of Lyle Hogg in Support of Plaintiff's Motion for Preliminary Injunction.*

[14] *Ibid* "2. Taxi speed is NO faster than a brisk walk."

[15] *Ibid* "5. Your crew and your passengers deserve a healthy, well rested, cairn pilot. The FAA and the company manuals require it. If you are ill, tired or stressed; STAYHOME" and "DO NOT FLY OVER 85 HOURS IN JUNE, even though the company has raised the pay cap. Reserve pilots just call in FATIGUED. WE MUST STAY TOGETHER."

[16] *Ibid*"3. Write up all discrepancies when and where they occur. Carry NOTHING", "7. If you are worried about your time being incorrect, do not fly stressed, call dispatch and have them read the times from catcrew. The parking brake is an effective compliance tool."

[17] *Ibid.*

May 12, 2011 mimicked a news story from June 26, 2011 reporting a new collective bargaining agreement between USAPA and the Company.[18] This fictitious news report strongly encouraged pilots to vent their frustration against US Airways by taking actions aimed at disrupting the Company's operational performance.[19]

- In light of these circumstances, it is my opinion that the dramatic increase in maintenance write-ups, prolonged taxi times, pilot fatigue calls and pilot induced delays and cancellations among the Company's East pilots that has occurred since May 1, 2011 and that has resulted in a statistically significant decline in the Company's on-time performance is the result of a concerted job action among East pilots and are not the result of random statistical variation.

7. The remainder of my report is organized as follows. Section III describes in detail my statistical analysis of various measures of pilot behavior and how the dramatic increase in these measures since May 1, 2011 has significantly impacted the Company's operational performance. Section IV discusses how the recent deterioration in US

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[18] See Exhibit 18 to *Declaration of Lyle Hogg in Support of Plaintiff's Motion for Preliminary Injunction.*

[19] For example, the fictitious news posting stated *"the frustration felt by the pilots over the slow pace of negotiations appears to have negatively affected the daily operations of the carrier to the point where passengers are "booking away" from the airline potentially costing the carrier hundreds of millions in future revenue. After a stellar performance in 2010 and again in the first half of 2011, when US Airways led the industry in on-time and completion factor the carrier recently plummeted to dead-last in on-time, flight completions and customer complaints. Last week US Airways emailed a letter to its frequent flyers apologizing for its recent poor performance while promising to fix the problems in the coming weeks."*

Airways' operational performance since May 1, 2011 has adversely impacted its competitive position in the U.S. airline industry and quantifies how US Airways' deteriorating on-time performance attributable to pilot actions is likely to impact its revenues. Section V quantifies other harm that Company and its passengers have suffered because of pilot job actions.

III. STATISTICAL ANALYSIS OF US AIRWAYS' PILOT BEHAVIOR AND OPERATIONAL DISRUPTIONS

8. In this section of my report, I describe in detail my analysis of various measures of pilot behavior and why basic statistical analysis indicates that the observed increase in each measure is indicative of a concerted job action by East pilots rather than the result of random statistical variation. I begin by examining several measures of pilot behavior (i.e., maintenance write-ups, taxi times, pilot fatigue calls and pilot-induced delays). I then demonstrate how increases in these measures have adversely impacted various aspects of the Company's operational performance.

A. Maintenance Write Ups

9. Each aircraft contains a log of minor equipment issues or maintenance items that—in most cases—have no effect on the aircraft's airworthiness and that would typically be fixed either overnight or once the aircraft reached a station with a full maintenance

operation.[20] However, the Captain of an aircraft can elect—within certain bounds—to require items on this "Minimum Equipment List" ("MEL") to be repaired prior to accepting the aircraft or conducting a flight.[21] Requiring maintenance that is routinely deferred until an aircraft is due to be taken out of service for maintenance not only leads to delays, but also unnecessarily increases the Company's maintenance costs. This is especially true when a pilot requests unnecessary maintenance at an airport where the Company does not maintain mechanics (and parts inventory) of its own and needs to rely on third-party maintenance (or, alternatively, wait for a Company mechanic and parts to be flown in).

10. As illustrated in Exhibit 1, the seven-day moving average of maintenance write-up rates among US Airways' East pilots began rising sharply starting in May of this year and for week ending July 26, 2011, stood at 33.48%.[22] This rate is in dramatic contrast to the historical average rate of 23.56%.

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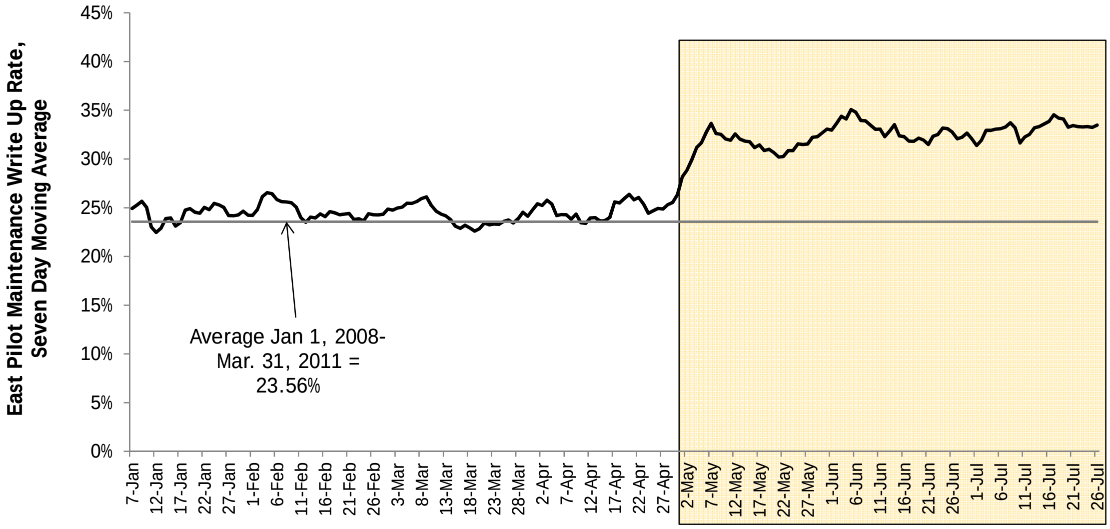
[20] See *Declaration of Lyle Hogg in Support of Plaintiff's Motion for Preliminary Injunction,* paragraph 7. Such items could include a malfunctioning seat, or a host of other issues.

[21] See *Declaration of Lyle Hogg in Support of Plaintiff's Motion for Preliminary Injunction,* paragraphs 14 and 29.

[22] The maintenance write-up rate is computed as the number of flight deck maintenance write-ups as a proportion of daily scheduled flights. For the purposes of my analysis, I have focused on flight deck related write-ups (i.e., "FDML").

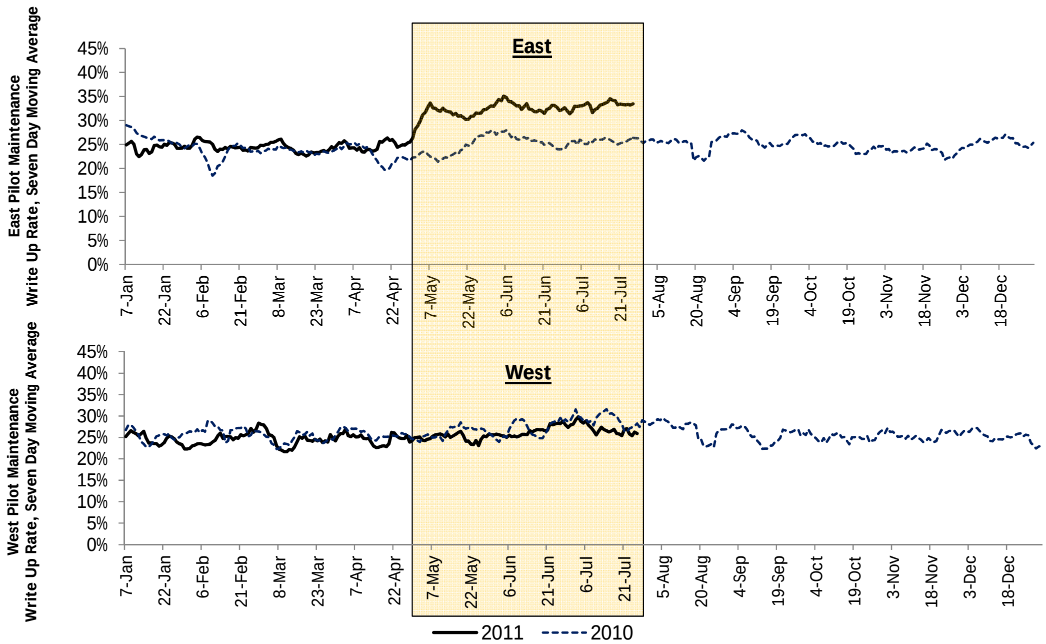
EXHIBIT 1: MAINTENANCE WRITE-UP RATES FOR US AIRWAYS' EAST PILOTS, JANUARY 1, 2011 TO JULY 26, 2011 (SEVEN DAY MOVING AVERAGE)



Sources: Analysis of US Airways data.
Notes: Seven day moving average.

11. Exhibit 2 compares seven-day average maintenance write-up rates for US Airways' East and West pilots in 2011 to their rates in 2010. Exhibit 2 demonstrates that while maintenance write-up rates in 2011 for both East and West pilots tracked 2010 levels until late April, the rates for East pilots sharply diverged starting in May.

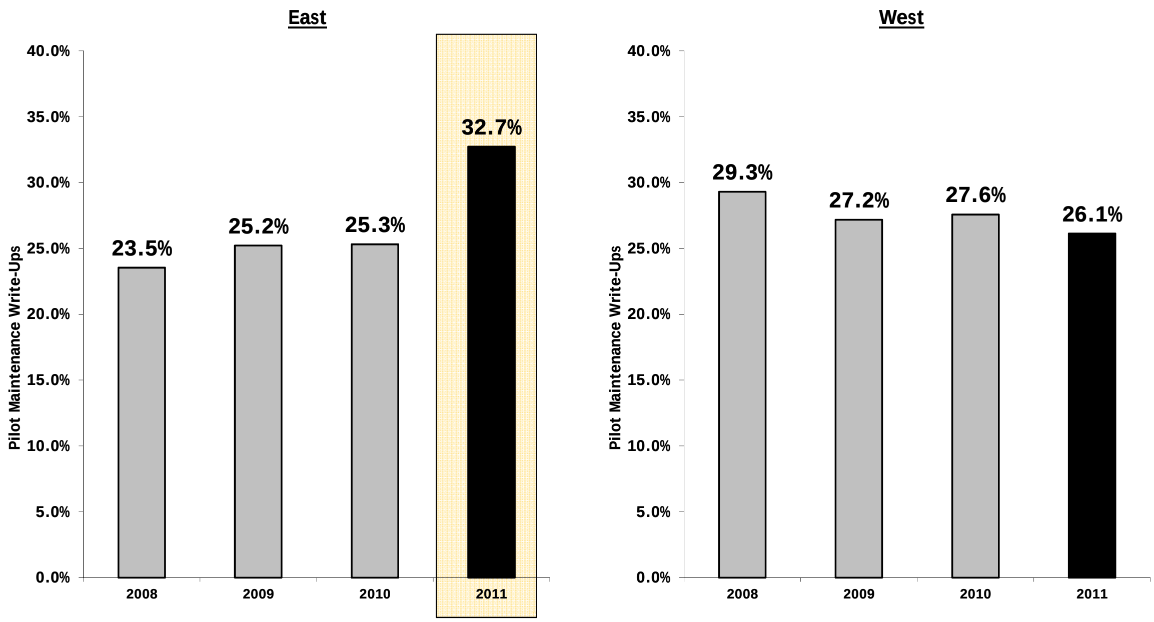
EXHIBIT 2: MAINTENANCE WRITE-UP RATES FOR US AIRWAYS' EAST PILOTS DIVERGED SHARPLY FROM 2010 LEVELS STARTING IN MAY (SEVEN DAY MOVING AVERAGES)



Sources: Analysis of US Airways operations data.
Notes: Seven day moving average.

12. Moreover, as demonstrated in Exhibit 3, while maintenance write-up rates for May, June and the first 26 days of July had been relatively flat for the past several years, rates between May 1 and July 26, 2011 were substantially higher than in any of the previous three years for East pilots, but declined for West pilots.

EXHIBIT 3: MAINTENANCE WRITE-UP RATES FOR US AIRWAYS' PILOTS
MAY 1ST TO JULY 26, 2008-2011



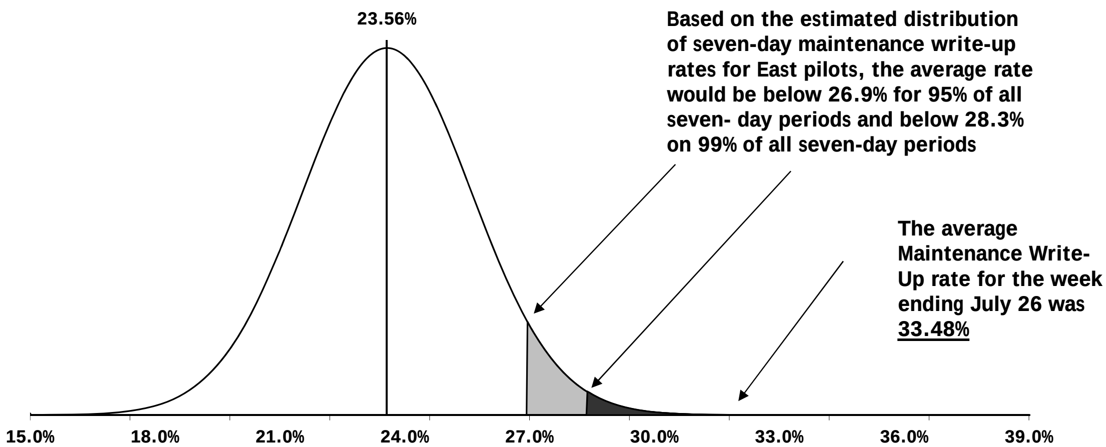
Sources: Analysis of US Airways data.
Notes: Average maintenance write-up for May 1st –July 26th of each year.

13. Economists and statisticians routinely rely upon a variety of statistical techniques to determine the likelihood that an observed outcome lies within the range of random variation. Based on a "control period" of data from January 1, 2008 to March 31, 2011 and assuming that average seven-day maintenance write-up rates by pilots follow a "normal"-shaped distribution,[23] one would expect that the *average* seven-day maintenance write-up rate for US Airways' East operations would be approximately 23.56%, with a standard deviation of approximately 2.04%. This "distribution" is depicted graphically in Exhibit 4, which also demonstrates that the average seven-day East maintenance write-up rate for a randomly selected seven-day period would be

[23] Analysis of seven-day maintenance write-up rates by US Airways pilots strongly suggests that the data follows a *T*-distribution with 168 degrees of freedom, which is close approximation of the Normal distribution.

below 26.93% 95 percent of the time, and below 28.34% 99 percent of time. As shown in Exhibit 4, the observed maintenance write-up rate for US Airways' East pilots for the week ending July 26, 2011 was 33.48%, well above what one would expect to occur even 1% of the time.[24]

EXHIBIT 4: THE MAINTENANCE WRITE-UP RATE FOR US AIRWAYS' EAST OPERATIONS FOR THE WEEK ENDING JULY 26, 2011 OF 33.48% IS WELL OUTSIDE THE RANGE OF RANDOM VARIATION



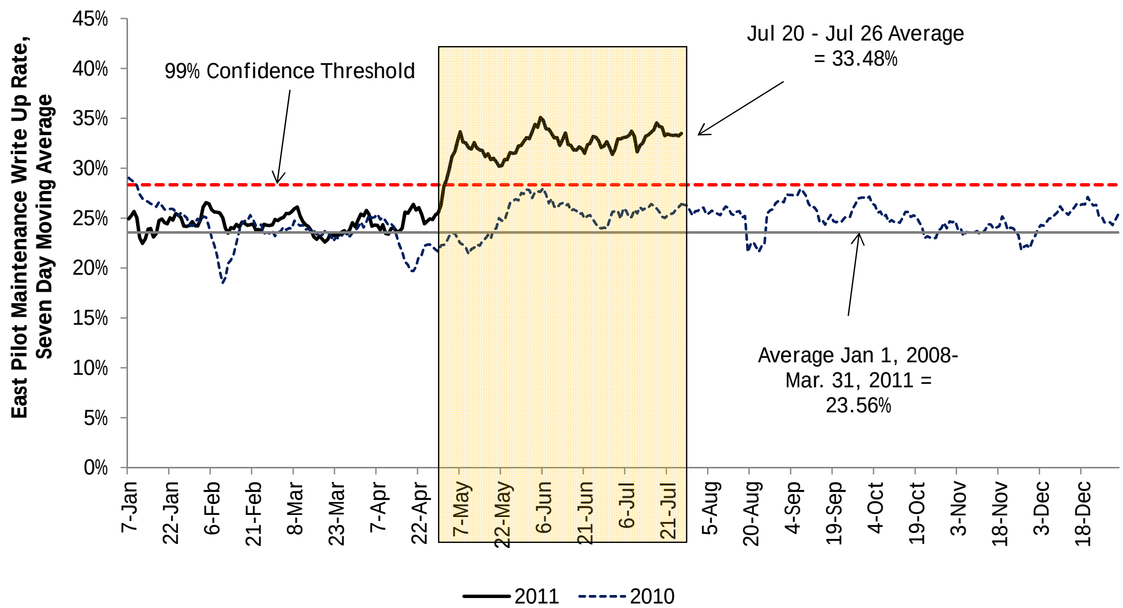
Sources: Analysis of US Airways data.
Notes: Estimated distribution of the average seven-day Maintenance Write Up rates for all East pilots from January 1, 2008 – March 31, 2011. Assumes that average seven-day non-overlapping Maintenance Write Up rates follows a t-distribution with 168 degrees of freedom (standard deviation of 2.04%).

14. The probability that one would observe an average maintenance write-up rate over a seven day period of at least 33.48% for US Airways' East operations is only 0.00013% (or roughly one-in-800,000). This demonstrates that the extraordinarily high level of maintenance write-ups by US Airways' East pilots for the week ending July 26, 2011 was unlikely to be the result of normal random variation and therefore the result of

[24] It is standard practice among economists and statisticians to evaluate statistical significance based at the 5% and 1% levels (alternatively, the 95% and 99% confidence levels). Thus, when the probability that an observed value is greater than 5%, economists and statisticians typically agree that the observed value could have been the result of random variation.

other collaborative behavior. Moreover, as demonstrated by Exhibit 5, the elevated level of pilot write-ups has persisted continuously since May 1st.

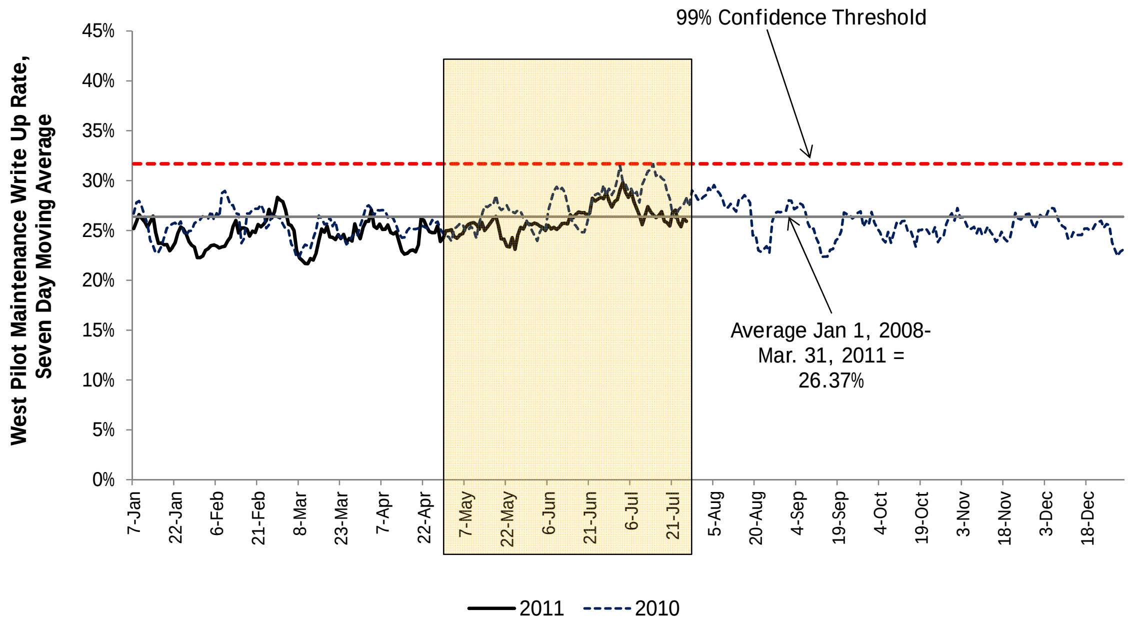
EXHIBIT 5: THE MAINTENANCE WRITE-UP RATE FOR US AIRWAYS' EAST OPERATIONS SINCE MAY 1ST, 2011 IS WELL OUTSIDE THE RANGE OF RANDOM VARIATION



Sources: Analysis of US Airways data.
Notes: Confidence threshold for seven day average based on a t-distribution with 168 degrees of freedom (for the period January 1, 2008-March 31, 2011).

15. Although Exhibit 5 demonstrates that the observed maintenance write-up rate for East pilots has been well outside the range of what could be expected to occur as a result of random variation since May 1st, Exhibit 6 demonstrates that a comparable analysis of maintenance write-up rates for US Airways' *West* pilots shows no such anomaly.

EXHIBIT 6: MAINTENANCE WRITE-UP RATES FOR US AIRWAYS' WEST OPERATIONS HAVE REMAINED WELL WITHIN THEIR HISTORICAL RANGE SINCE MAY 1, 2011

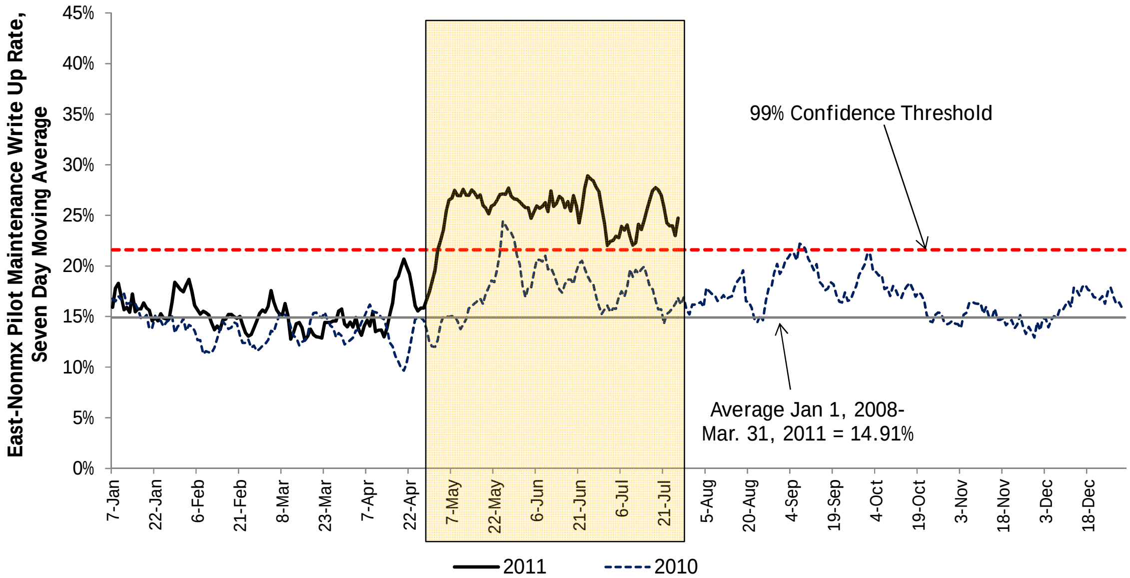


Sources: Analysis of US Airways data.
Notes: Confidence threshold for seven day average based on a t-distribution with 168 degrees of freedom (for the period January1, 2008-March 31, 2011).

16. There is also evidence that the rate at which East pilots are increasing their use of maintenance write-ups is *far greater* at airports where US Airways has no maintenance personnel of their own. At these airports, the Company incurs substantially higher costs (and potential for delays and cancellations) when a maintenance write-up is issued because the Company needs to rely on third party maintenance or even fly in a mechanic or part before the flight can depart. For example, the historical maintenance write-up rate among East pilots at airports where US Airways does not have any maintenance staff of its own is 14.91%. For the week ending July 26, 2011, this rate was 24.74%, nearly double the long run average. The probability that this surge in non-maintenance station write-ups was a "random"

occurrence is approximately 0.0035% (or one-in-2,824). Moreover, as demonstrated by Exhibit 7, the rate of maintenance write-ups at non-maintenance stations surged shortly after May 1st, 2011 and has remained at or above the 99% confidence threshold since that time.

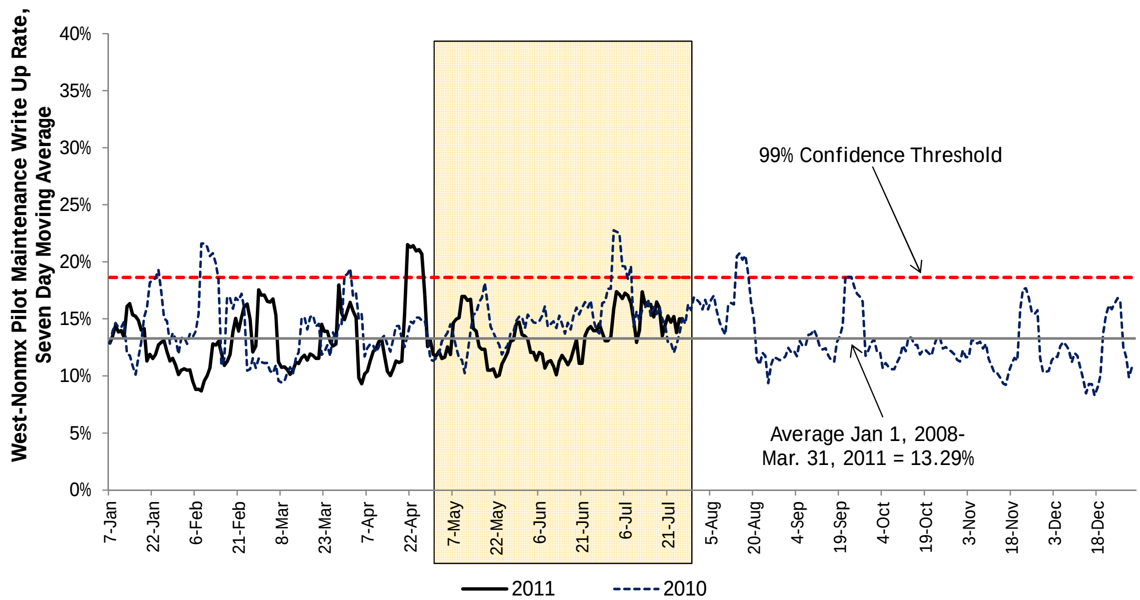
EXHIBIT 7: THE MAINTENANCE WRITE-UP RATE AT NON-MAINTENANCE STATIONS FOR US AIRWAYS' EAST OPERATIONS SURGED AFTER MAY 1ST, 2011



Sources: Analysis of US Airways data.
Notes: Confidence threshold for seven day average based on a t-distribution with 168 degrees of freedom (for the period January 1, 2008-March 31, 2011).

17. In contrast, Exhibit 8 demonstrates that non-maintenance station write-ups by the Company's West pilots have remained well within their historical range since May 1st.

EXHIBIT 8: THE MAINTENANCE WRITE-UP RATE AT NON-MAINTENANCE STATIONS FOR US AIRWAYS' WEST OPERATIONS HAVE REMAINED WELL WITHIN THEIR HISTORICAL RANGE SINCE MAY 1ST, 2011



Sources: Analysis of US Airways data.
Notes: Confidence threshold for seven day average based on a t-distribution with 168 degrees of freedom (for the period January 1, 2008-March 31, 2011).

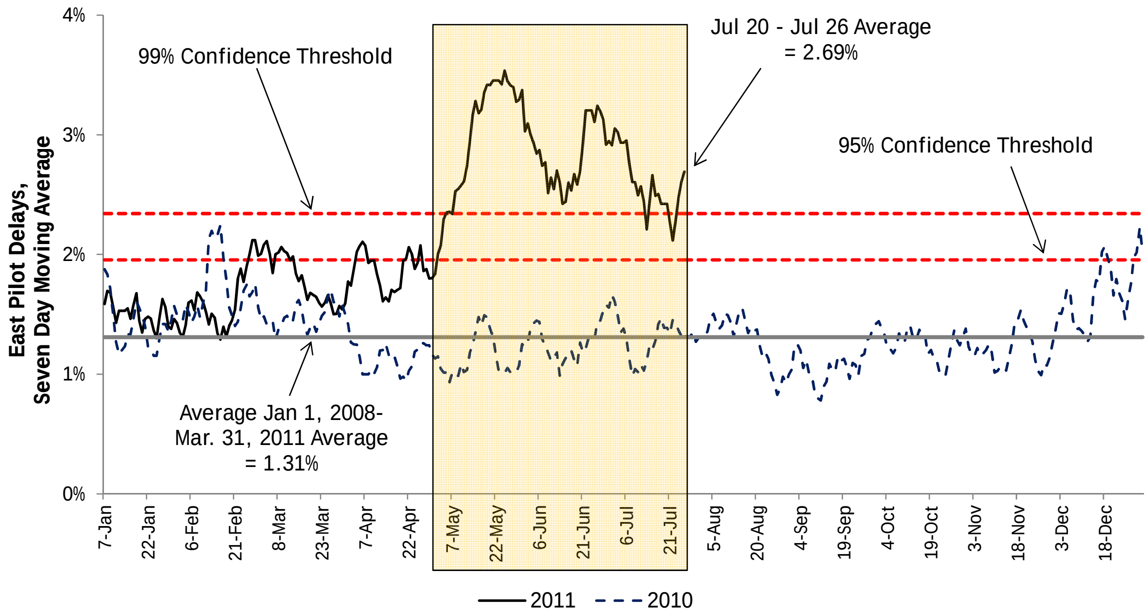
B. Pilot Induced Delays

18. US Airways classifies flight delays using several categories (i.e., weather, late arrival of inbound aircraft, late crew connections, etc.). One delay category is the "FP0" code, which the Company uses to track pilot-induced delays for reasons other than the crew arriving late to the aircraft.[25] Exhibit 9 demonstrates that FP0 delays for US Airways' East operations began to rise sharply after May 1, 2011 and have remained well outside the range of random variation since that time. For example, based on the historical distribution of weekly FP0 delay rates, one would expect the average seven-

[25] See *Declaration of Kerry F. Hester in Support of Plaintiff's Motion for Preliminary Injunction*, paragraph 9.

day FP0 delay rate to be below 1.96% 95 percent of the time and below 2.34% 99 percent of the time.[26] However, since May 1st, the observed FP0 delay rate has consistently remained above the 95% confidence threshold and has often been well above the 99% confidence threshold.[27]

EXHIBIT 9: THE PILOT INDUCED DELAY RATE (FP0) FOR THE WEEK ENDING JULY 26 OF 2.69% IS WELL OUTSIDE THE RANGE OF RANDOM VARIATION



Sources: Analysis of US Airways data.
Notes: Confidence threshold for seven day average based on a lognormal distribution (for the period January 1, 2008-March 31, 2011).

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[26] Because the distribution of pilot delay rates are skewed to the right (rather than being symmetrical around the mean as was the case with the maintenance write-up rates) I have assumed a log-normal rather than normal distribution. This distribution is routinely used by economists and statisticians when the variable of interest is skewed to the right. See, for example, *Statistical Inference*, page 111 by George Casella and Roger Berger, Belmont CA: Wadsworth & Brooks Cole, 1990.

[27] Moreover, a comparable analysis of FP0 delays for US Airways' West operations indicates that they have remained well within the range of random variation since May 1st, 2011.

C. Pilot Fatigue Calls

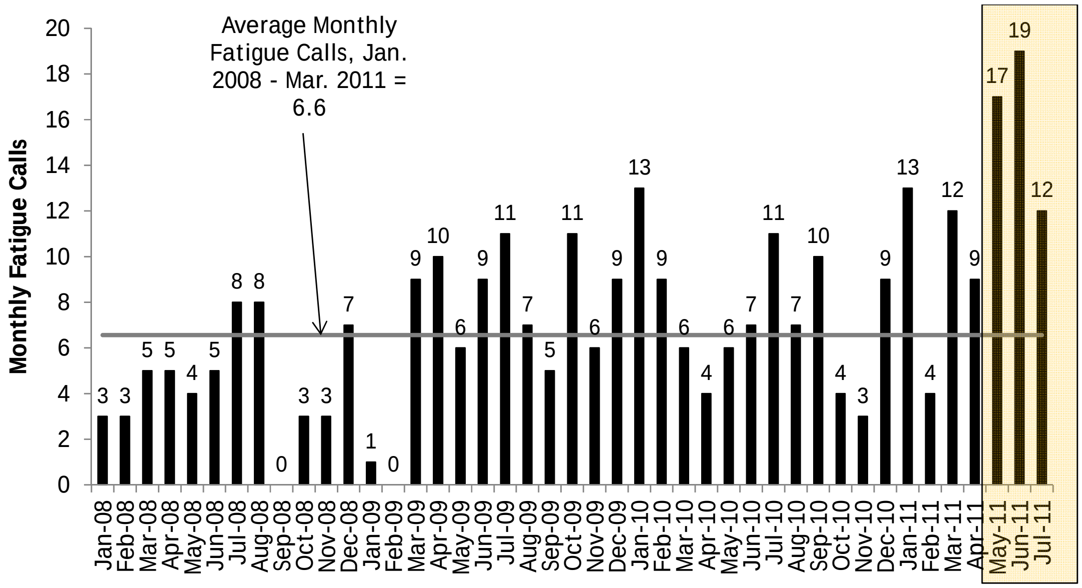
19. On rare occasions, a pilot reports that he or she is too fatigued to fly his or her assigned trip and when this occurs, the flight the pilot was assigned is often delayed or cancelled.[28] Historically, only 17.5% of all days have had an East pilot fatigue call. However, the frequency of pilot fatigue calls has increased sharply, and there has been at least one East pilot fatigue call on 42% of days since May 1, 2011.

20. Exhibit 10 shows monthly East fatigue calls since January 2008 and demonstrates that, on average there were 6.6 per month fatigue calls between January 2008 and March 2011. Exhibit 10 also demonstrates that in May, June and the first 25 days of July 2011, there were 17, 19 and 12 fatigue calls respectively.[29] The probability that the level of fatigue calls observed in May, and June and July of this year could have been the result of random statistical variation in May and June is less than 0.26%, and 0.03% and 1.98% respectively.

[28] See *Declaration of Kerry F. Hester in Support of Plaintiff's Motion for Preliminary Injunction,* paragraph 9.

[29] In contrast, the number of West Fatigue calls in May (three), June (five) and the first 25 days of July (one) 2011 was below the historical average of 5.1.

EXHIBIT 10: THE FREQUENCY OF PILOT FATIGUE CALLS ROSE SHARPLY STARTING IN MAY 2011



Sources: US Airways.
Notes: July is through the 25th.

D. Prolonged Taxi Times

21. Pilots can exercise a great deal of discretion in the speed at which they taxi the aircraft before take-off and after landing. Excessively slow taxiing leads to prolonged taxi times, which in turn contributes to flight delays (thus creating passenger inconvenience and imposing additional costs on the Company). Because of its importance to overall operational performance, US Airways closely monitors the taxi-out and taxi-in times of each of its flights.[30]

[30] See *Declaration of Kerry F. Hester in Support of Plaintiff's Motion for Preliminary Injunction*, paragraph 9.

22. Taxi times can be influenced by a variety of factors, including weather conditions and airport ground congestion. Consequently, determining whether US Airways' East pilots have been intentionally using slow taxi speeds requires that one "control" for such factors. I have utilized two different methods that control for weather and other factors that potentially influence taxi times and both yield the same basic finding: *since May 1, 2011, East taxi times (both in and out) have increased beyond what could be expected as a result of normal, statistical variation.*

23. The first method used to determine whether pilot actions have resulted in prolonged taxi times is to compare the taxi times for the Company's East mainline operations to those of its "Express" operations. US Airways' Express operations are comprised of flights on regional jet and turboprop aircraft operated by US Airways' regional carrier partners such as Piedmont, PSA, Chautauqua, Republic, Mesa and Air Wisconsin. US Airways Express operations account for approximately 60% of US Airways' total (i.e., mainline and Express) "East" operations[31] and are subject to the same weather (and any other airport specific issues) that would impact taxi time performance. Moreover, US Airways Express pilots are *not* members of USAPA.

24. It is important to emphasize that in general, mainline taxi times tend to be longer than Express taxi times. For example, between January 1, 2008 and March 31, 2011, East mainline taxi times exceeded East Express taxi times by approximately 0.24 minutes. However, because the daily *difference* between East mainline and Express taxi times

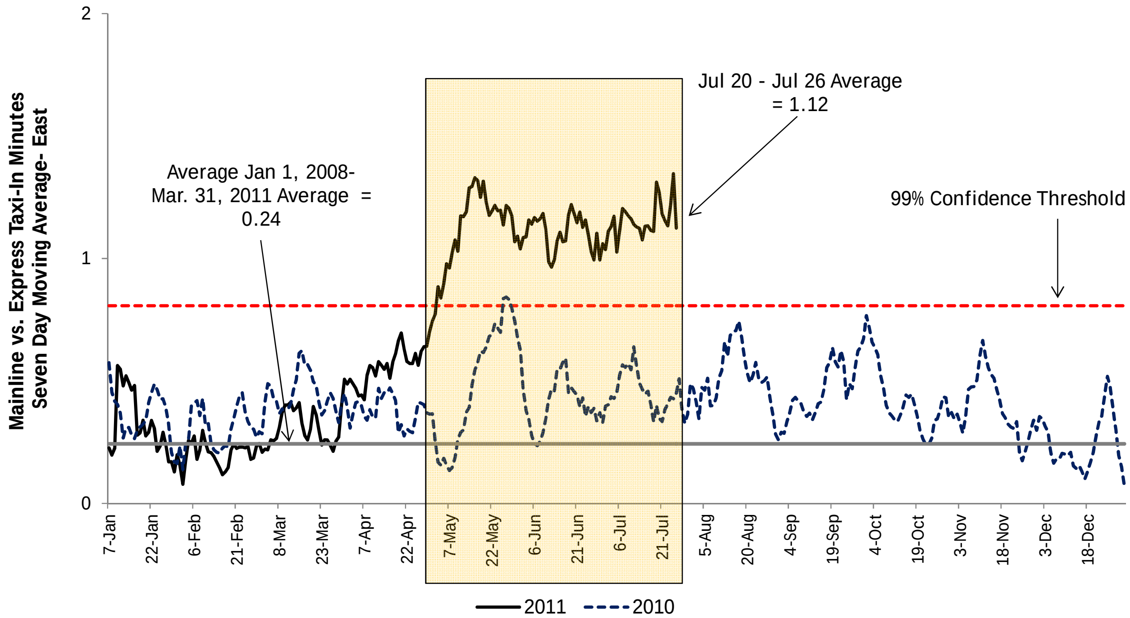
[31] Source OAG. For Express "East" operations, I included any US Airways Express flight that neither originated nor terminated in Phoenix or Las Vegas.

follows (approximately) a normal statistical distribution, one can test the hypothesis of whether pilot actions since May 1st has resulted in the gap between East mainline and Express taxi times widening beyond what one would expect to happen as a result of normal statistical variation.

25. Based on their historical distribution, the average difference between East mainline and Express taxi-in times should be to be below 0.64 minutes 95 percent of the time and below 0.81 minutes 99 percent of the time. However, as depicted in Exhibit 11 below, the gap between East mainline and Express taxi-in times began to widen considerably after May 1, 2011 and has consistently been well above the 99 percent confidence threshold since that time. For example, for the week ending July 26, 2011, the difference between East mainline and Express taxi-in times was 1.12 minutes, more than four times the historical average of 0.24 minutes.[32] Put differently, the probability that the observed difference between East mainline and Express Taxi-in times for the week ending July 26, 2011 of 1.12 minutes was a "random" occurrence is approximately 0.02% (or approximately one-in-6,179).

[32] The difference between East and Express taxi-in time since May 1st has increased to 1.14 minutes.

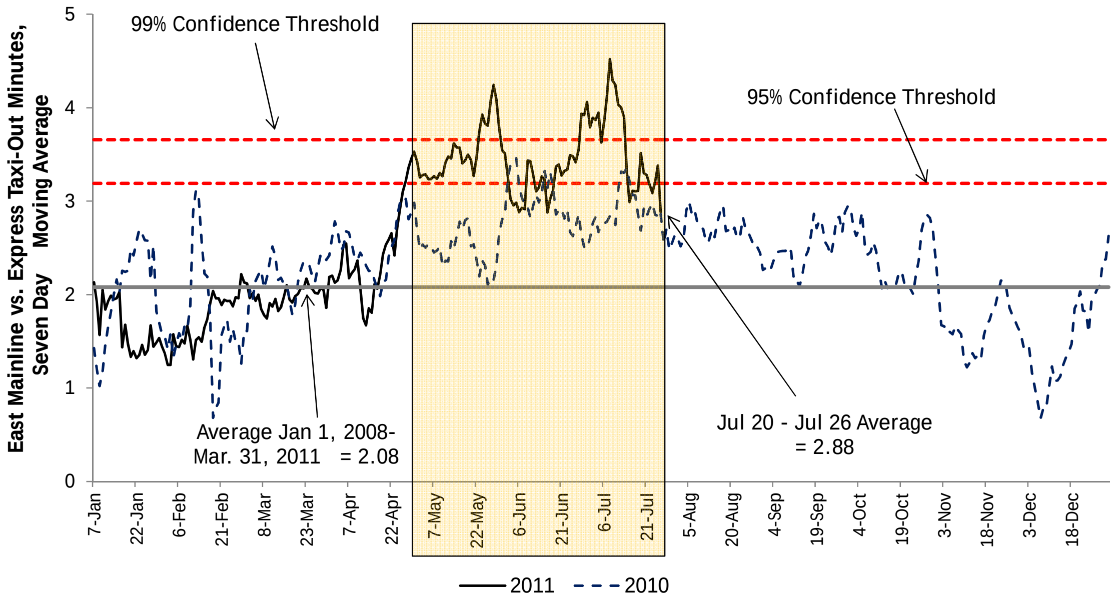
EXHIBIT 11: THE DIFFERENCE BETWEEN EAST MAINLINE AND EXPRESS TAXI-IN TIMES SINCE MAY 1, 2011 HAS WIDENED TO LEVELS WELL OUTSIDE THE RANGE OF RANDOM VARIATION



Sources: Analysis of US Airways data.
Notes: Confidence threshold for seven day average based on a t-distribution with 168 degrees of freedom (for the period January1, 2008-March 31, 2011).

26. Exhibit 12 repeats the analysis from above for Taxi-out times. Based on their historical distribution, one would expect the average difference between East mainline and Express taxi-out times to be below 3.19 minutes 95 percent of the time and below 3.66 minutes 99 percent of the time. However, as depicted in Exhibit 12, the gap between East mainline and Express taxi-out times also began to widen considerably after May 1, 2011 and has typically been above the 95 percent threshold (and sometimes above the 99 percent threshold) since that time.

EXHIBIT 12: THE DIFFERENCE BETWEEN EAST MAINLINE AND EXPRESS TAXI-OUT TIMES SINCE MAY 1, 2011 HAVE WIDENED TO LEVELS WELL OUTSIDE THE RANGE OF RANDOM VARIATION



Sources: Analysis of US Airways data.
Notes: Confidence threshold for seven day average based on a t-distribution with 168 degrees of freedom (for the period January 1, 2008-March 31, 2011).

27. A second approach to ascertain the degree to which pilot actions have resulted in prolonged taxi times is to estimate a regression model that directly controls for the key factors influencing taxi times. Regression analysis is a standard analytical tool used by economists (and other researchers) to determine the relative importance of potential explanatory (i.e., "independent") variables in explaining the variation of another variable of interest (the "dependent" variable), taxi times in this instance. Regression analysis allows one to systematically account for a wide range of factors that can

influence a carrier's operational performance, including (among other things) daily weather variation, day of week, season, and airport congestion.[33]

28. The regression data set is comprised of approximately three and a half years of daily observations (1,303 in total) measuring the Company's average East taxi-in and taxi-out times in minutes (the dependant variable). To measure the impact of pilot actions on taxi times, a dummy variable **D(post-May 1)** is included, which takes the value 1 for all observations on or after May 1, 2011 (the date that marks the start of USAPA's Safety First Campaign). When other control variables are included in the regression to account for systematic variation in taxi-times (as described below), the estimated coefficient for the **D(post-May 1)** variable provides a reasonable estimate of the aggregate impact of pilot actions on average taxi times.

29. It is well understood that airline operational performance can be influenced by weather. Differences in day-to-day weather is controlled for using three different weather variables. **Rainfall** measures the average daily amount of precipitation (measured in tenths of an inch) across each of the primary hubs or focus cities for US Airways (CLT, PHL, DCA, BOS, LGA, PHX and LAS), while **Snow** measures the

[33] Regression analyses of airline operations has been the topic of numerous, published economic research papers. See, for example, "Network Effects, Congestion and Air Traffic Delays: Or Why Not All Delays Are Evil", Christopher Mayer and Todd Sinai, *American Economic Review*, Vol. 93, No. 4 (2003), pp. 1194-1215, "Retracting a Gift: How Does Employee Effort Respond to Wage Reductions", Darin Lee and Nicholas Rupp, *Journal of Labor Economics*, vol. 25 (2007), No. 4, pp.725-761, "Does Competition Influence Airline On-Time Performance?", by Nicholas Rupp, Douglas Owens and L. Wayne Plumly, Chapter 11 in *Advances in Airline Economics, Volume 1*, Darin Lee, Editor, Elsevier, 2006, pp.247-268, and "Do carriers internalize congestion costs? Empirical evidence on the internalization question," by Nicholas Rupp, *Journal of Urban Economics*, Volume 65 (2009), pp. 24-37.

average daily amount of snow (measured in inches) across the same set of airports.[34] To control for delays that may be the result of unusually strong winds, a wind variable (**Average Daily Wind**) that is computed as the average wind speed (in miles per hour) across the same set of airports is also included. For each of the three weather variables, their squared value is also included (**Rain Squared**, **Snow Squared** and **Wind Squared**) to account for potential non-linearities in their impact on taxi times.[35]

30. A number of other control variables are included in the regression to control for variability in airport congestion and seasonal and/or day of week variation in traffic. These include day-of-week dummy variables, month-of-year and year dummy variables and the total number of US Airways (mainline plus Express) operations, denoted **US Airways Scheduled Arrivals**. Moreover, the **D(Computer Outages)** denotes a dummy variable that takes the value 1 on days where there was either a US Airways computer or power outage that caused substantial flight disruptions[36] and **D(CLT De-icing Fluid Shortage)** denotes a dummy variable on days when US Airways ran out of de-icing fluid at Charlotte.[37]

[34] The averages are weighted by East operations.

[35] For example, the marginal impact of increasing **snow** from zero to one inch may be greater than from four to five inches.

[36] The variable **D(Computer Outages)** takes the value 1 on the following dates: June 10, 2011 June 18, 2011, June 19 2011 and January 29, 2009.

[37] The variable **D(CLT De-icing Fluid Shortage)** takes the value 1 on January 11, 2011 and is 0 otherwise.

31. Exhibit 13 below summarizes the results of the regression model for taxi-out and taxi-in times for East mainline (columns 1 and 2) and East Express (columns 3 and 4).[38] The table includes the estimated coefficients for each variable in addition to their standard error (in parentheses). Estimated coefficients noted with a single asterisk (*) are statistically significant at the 95% confidence level and estimated coefficients noted with two asterisks (**) are significant at the 99% confidence level. The estimated coefficients are interpreted as the marginal effect of that variable on taxi-times *holding all other variables constant*. For example, column 1 of Exhibit 13 shows that each tenth of an inch of rain (relative to the average amount of rain for a particular month and day of week and holding all other variables constant) increases average taxi out times for mainline East flights by 0.777 minutes. Likewise, the estimated coefficient on **D(post-May 1)** in columns (1) and (2) indicate that pilot actions since May 1st have added, on average, 0.900 minutes to taxi-out times and 0.626 minutes to taxi-in times for East mainline flights (the average taxi-out and taxi-in times historically are 19.35 and 6.26 minutes, respectively). Importantly, however, the estimated coefficients on **D(post-May 1)** in columns (3) and (4) are statistically *insignificant*, indicating that taxi times since May 1st have not increased for East Express flights since May 1st.

[38] As is commonly done, I have suppressed the month, year and day of week dummy variables in the tables for the purposes of presentation.

EXHIBIT 13: TAXI-TIME REGRESSION MODEL RESULTS

	(1)	(2)	(3)	(4)
	Taxi Out Minutes	Taxi In Minutes	Taxi Out Minutes	Taxi In Minutes
	East Mainline	East Mainline	East Express	East Express
D(post-May 1)	0.900**	0.626**	-0.117	0.00846
	(0.274)	(0.0639)	(0.240)	(0.0549)
D(Computer Outages)	-0.175	0.308	-0.323	0.322
	(0.855)	(0.200)	(0.750)	(0.171)
D(CLT De-icing Fluid Shortage)	2.907	-0.209	3.875**	-0.182
	(1.704)	(0.398)	(1.500)	(0.342)
US Airways Scheduled Arrivals	0.00219**	0.000352**	0.00174**	0.000544**
	(0.000397)	(9.26e-05)	(0.000348)	(7.94e-05)
Rainfall (Tenths of Inches)	0.777**	0.138**	0.648**	0.127**
	(0.0443)	(0.0103)	(0.0387)	(0.00884)
Rain Squared	-0.0396**	-0.00622**	-0.0347**	-0.00596**
	(0.00388)	(0.000906)	(0.00332)	(0.000759)
Snow (Inches)	3.121**	0.441**	2.473**	0.444**
	(0.283)	(0.0661)	(0.206)	(0.0471)
Snow Squared	-0.425**	-0.0481**	-0.280**	-0.0553**
	(0.0516)	(0.0120)	(0.0276)	(0.00630)
Average Daily Wind (MPH)	0.245*	-0.0518*	0.235**	-0.0821**
	(0.105)	(0.0244)	(0.0779)	(0.0178)
Wind Squared	-0.00947	0.00175	-0.00600	0.00346**
	(0.00566)	(0.00132)	(0.00400)	(0.000912)
Constant	10.23**	5.251**	9.924**	5.023**
	(1.134)	(0.265)	(0.981)	(0.224)
Observations	1,303	1,303	1,303	1,303
R-squared	0.500	0.619	0.500	0.502

** p<0.01, * p<0.05
Standard errors in parentheses

Sources: Analysis of US Airways operations data; US Airways; National Climatic Data Center Data Set 3210; wunderground.com; OAG; Data period is January 1, 2008- July 26, 2011.
Notes: : D() are "dummy variables." US Airways Computer Outages are 6/10/2011, 6/18/2011, 6/19/2011, and 1/29/2009. CLT De-icing Fluid Shortage is January 11, 2011. Weather variables are weighted by scheduled US Airways Departures for CLT, PHL, BOS, DCA, LGA, PHX and LAS. US Airways Scheduled Arrivals are for mainline and express. Yearly, monthly and day-of-week dummies not shown. CLT Mainline only includes East pilots.

E. Flight Delays

32. The dramatic increase in pilot maintenance write-ups, pilot fatigue calls, pilot induced departure delays and prolonged taxi times that US Airways has experienced in its East operations since May 1, 2011 has significantly impacted the Company's operational performance, resulting in significant harm to the Company and causing substantial

inconvenience for US Airways' passengers. Like my analysis of taxi times, to ascertain whether pilot actions since May 1st have adversely impacted US Airways' on-time performance, I estimate a regression model that controls for other factors known to influence on-time performance such as weather.

33. Estimating the impact of pilot actions on on-time performance metrics requires two small changes to the taxi-time regression models estimated in Section D above. First, I replaced the dependent variable from taxi-in or taxi-out minutes to one of two on-time variables of particular relevance to passengers: minutes of arrival delay and the percentage of operations that arrived within 14 minutes of their scheduled arrival time—a metric frequently used by the U.S. Department of Transportation to compare on-time performance across carriers referred to as "A:14." Second, unlike taxi-times, on-time performance is likely to be impacted by how "full" the Company's flights are on a given day, since this impacts the amount of time required to enplane and deplane passengers. Thus, each of the regressions summarized below also includes a **Load Factor** variable, a standard industry metric defined as the percentage of seats filled each day.

34. Exhibit 14 summarizes the results from the regression model for A:14 and minutes of arrival delay for two sets of the Company's operations: East mainline (columns 1 and 2), Charlotte Mainline (columns 3 and 4). As shown in columns (1) and (2) of Exhibit 14, the **D(post-May 1)** variable is statistically significant at the 99% confidence level

for both delay measures. For example, column (1) of Exhibit 14 shows that pilot actions since May 1st have reduced US Airways' East mainline A:14 performance by approximately 10.9 percentage points. Likewise, column (2) demonstrates that pilot actions since May 1st have added approximately 6.48 minutes of incremental delay (on average) to East mainline flights. Moreover, as expected, snow, rain and high winds all adversely impact each measure of on-time performance, as do higher load factors.

EXHIBIT 14: ARRIVAL DELAY REGRESSION RESULTS FOR EAST MAINLINE AND CHARLOTTE MAINLINE FLIGHTS

	(1)	(2)	(3)	(4)
	A:14	Arrival Minutes Late	A:14	Arrival Minutes Late
	East Mainline	East Mainline	CLT Mainline	CLT Mainline
D(post-May 1)	-0.109**	6.479**	-0.120**	6.362**
	(0.0114)	(0.830)	(0.0120)	(0.727)
D(Computer Outages)	-0.119**	8.119**	-0.149**	10.90**
	(0.0355)	(2.587)	(0.0373)	(2.255)
D(CLT De-icing Fluid Shortage)	-0.345**	5.680	-0.761**	31.37**
	(0.0707)	(5.156)	(0.0746)	(4.512)
Load Factor	-0.00327**	0.178**	-0.00261**	0.101**
	(0.000427)	(0.0311)	(0.000540)	(0.0326)
US Airways Scheduled Arrivals	-5.37e-05**	0.00385**	-0.000222**	0.0138**
	(1.66e-05)	(0.00121)	(8.12e-05)	(0.00491)
Rainfall (Tenths of Inches)	-0.0434**	2.864**	-0.0229**	1.256**
	(0.00184)	(0.134)	(0.00120)	(0.0728)
Rain Squared	0.00203**	-0.138**	0.000542**	-0.0312**
	(0.000161)	(0.0117)	(5.12e-05)	(0.00309)
Snow (Inches)	-0.154**	9.224**	-0.307**	17.78**
	(0.0118)	(0.858)	(0.0280)	(1.694)
Snow Squared	0.0180**	-1.302**	0.0668**	-3.754**
	(0.00214)	(0.156)	(0.00960)	(0.580)
Average Daily Wind (MPH)	0.00347	-0.352	-0.00185	-0.0987
	(0.00434)	(0.317)	(0.00340)	(0.206)
Wind Squared	-0.000547*	0.0363*	-0.000343	0.0260*
	(0.000235)	(0.0171)	(0.000201)	(0.0121)
Constant	1.217**	-14.05**	1.193**	-8.410*
	(0.0545)	(3.977)	(0.0558)	(3.371)
Observations	1,303	1,303	1,303	1,303
R-squared	0.634	0.541	0.549	0.495

** p<0.01, * p<0.05

Standard errors in parentheses

Sources: Analysis of US Airways operations data; National Climatic Data Center Data Set 3210; wunderground.com; OAG. Data period is January 1, 2008-July 26, 2011.

Notes: D( ) are "dummy variables." US Airways Computer Outages are 6/10/2011, 6/18/2011, 6/19/2011, and 1/29/2009. CLT De-icing Fluid Shortage is January 11, 2011. Weather variables are weighted by scheduled US Airways departures for CLT, PHL, BOS, DCA, LGA, PHX and LAS. Yearly, monthly and day-of-week dummies not shown. US Airways Scheduled Arrivals are for mainline and express. CLT Mainline only includes East pilots.

35. Columns (3) and (4) of Exhibit 14 repeat the analysis but only for the subset of East mainline flights arriving at Charlotte, the Company's largest hub. The results for Charlotte are similar to those for the Company's overall East operations: pilot actions since May 1st have reduced US Airways' Charlotte mainline A:14 performance by

approximately 12.0 percentage points and have added approximately 6.36 minutes of incremental delay (on average) to Charlotte mainline flights.[39]

36. Exhibit15 estimates the same regression analysis from Exhibit 14, but for East Express (columns 1 and 2) and West mainline (columns 3 and 4) operations. In contrast to Exhibit 14, the **D(post-May 1)** dummy variable in columns (1) and (2) of Exhibit 15 is *not* statistically significant at either the 95% or 99% confidence, indicating that there has been no change in on-time performance for East Express flights since May 1st. Given that US Airways' East Express flights operate at predominantly the same airports (thus facing the same weather and airport congestion) as its East mainline operations, this is strong evidence that the decline in on-time performance experienced by US Airways East mainline flights since May 1st has been the result of pilot actions. Likewise, columns (3) and (4) of Exhibit 15 repeat the same regression analyses for West mainline flights. Like the East Express operations, the **D(post-May 1)** variable is not statistically significant for either delay measure. This too provides additional statistical evidence that the observed decline in on-time performance experience in the Company's East mainline operations have been the result of pilot actions.

[39] A comparable regressions of *departure* delay minutes shows that pilot actions since May 1st have resulted in an additional 5.53 minutes of delay for East mainline flights and an additional 8.45 minutes of delay for Charlotte mainline flights (both of these increases are significant at the 99% confidence level). Moreover, when the same regression is applied to West mainline operations, there is no statistically significant increase.

EXHIBIT 15: ARRIVAL DELAY REGRESSION RESULTS FOR EAST EXPRESS AND WEST MAINLINE FLIGHTS

	(1)	(2)	(3)	(4)
	A:14	Arrival Minutes Late	A:14	Arrival Minutes Late
	East Express	East Express	West Mainline	West Mainline
D(post-May 1)	-0.0130	0.544	-0.0135	1.024
	(0.0151)	(1.319)	(0.00896)	(0.565)
D(Computer Outages)	-0.0772	4.602	-0.101**	5.714**
	(0.0472)	(4.116)	(0.0280)	(1.766)
D(CLT De-icing Fluid Shortage)	-0.193*	-1.970	-0.123*	2.864
	(0.0946)	(8.244)	(0.0558)	(3.526)
Load Factor	-0.00373**	0.289**	-0.00226**	0.114**
	(0.000507)	(0.0442)	(0.000333)	(0.0210)
US Airways Scheduled Arrivals	-9.14e-05**	0.00135	-0.000207**	0.0117**
	(2.26e-05)	(0.00197)	(4.01e-05)	(0.00253)
Rainfall (Tenths of Inches)	-0.0557**	4.237**	-0.0368**	2.400**
	(0.00244)	(0.212)	(0.00376)	(0.238)
Rain Squared	0.00260**	-0.197**	0.00143**	-0.0958**
	(0.000209)	(0.0183)	(0.000549)	(0.0347)
Snow (Inches)	-0.138**	11.59**	-0.202**	6.649*
	(0.0130)	(1.132)	(0.0465)	(2.935)
Snow Squared	0.0135**	-1.456**	0.121**	-6.290**
	(0.00174)	(0.152)	(0.0372)	(2.350)
Average Daily Wind (MPH)	0.00911	-1.043*	-0.00615	0.0286
	(0.00490)	(0.428)	(0.00355)	(0.224)
Wind Squared	-0.000998**	0.0904**	-1.63e-05	0.0168
	(0.000252)	(0.0219)	(0.000220)	(0.0139)
Constant	1.281**	-9.862	1.164**	-7.851**
	(0.0645)	(5.622)	(0.0377)	(2.383)
Observations	1,303	1,303	1,303	1,303
R-squared	0.605	0.507	0.423	0.370

** p<0.01, * p<0.05
Standard errors in parentheses

Sources: Analysis of US Airways operations data; National Climatic Data Center Data Set 3210; wunderground.com; OAG. Data period is January 1, 2008-July 26, 2011.
Notes: D( ) are "dummy variables." US Airways Computer Outages are 6/10/2011, 6/18/2011, 6/19/2011, and 1/29/2009. CLT De-icing Fluid Shortage is January 11, 2011. Weather variables are weighted by scheduled US Airways departures for CLT, PHL, BOS, DCA, LGA, PHX and LAS. Yearly, monthly and day-of-week dummies not shown. US Airways Scheduled Arrivals are for mainline and express. CLT Mainline only includes East pilots.

37. I also conducted a series of regressions to assess the extent to which pilot actions since May 1st have adversely impacted US Airways' flight cancellation rate. The regressions mimic the delay regressions presented in Exhibits 14 and 15 above, except the dependent variable is changed to the proportion of daily scheduled flights

cancelled and the **Load Factor** variable has been excluded from model.[40] Exhibit 16 summarizes the results for East mainline (column 1), Charlotte mainline (column 2), East Express (column 3) and West mainline (column 4) flights. The estimated coefficient on **D(post-May 1)** is statistically significant at the 99% confidence level for East mainline flights and indicates that pilot actions since May 1st have resulted in more than a one percentage point increase in flight cancellations (this is equivalent to approximately 9 or 10 flights per day and represents approximately 60% of all East mainline flight cancellations since May 1st). The estimated coefficient on **D(post-May 1)** is also statistically significant at the 99% confidence level for Charlotte mainline flights and indicates that pilot actions since May 1st have resulted in nearly seven-tenths of a percentage point increase in flight cancellations at that airport (once again, this represents approximately 60% of all Charlotte mainline flight cancellations since May 1st). In contrast, the estimated coefficient on **D(post-May 1)** is not significant for either East Express or West mainline flights, suggesting that pilot actions—not other factors—are the cause of the elevated level of flight cancellations the Company has been experiencing for its East operations since May 1st.

[40] Unlike flight delays, there is little reason to believe that load factors will influence the rate at which flights are cancelled.

EXHIBIT 16: FLIGHT CANCELLATION REGRESSION RESULTS

	(1)	(2)	(3)	(4)
	Cancelation Rate	Cancelation Rate	Cancelation Rate	Cancelation Rate
	East Mainline	CLT Mainline	East Express	West Mainline
D(post-May 1)	0.0110**	0.00681*	0.00387	-5.82e-05
	(0.00362)	(0.00287)	(0.00559)	(0.00165)
D(Computer Outages)	-0.00115	0.000205	0.00500	0.00249
	(0.0113)	(0.00890)	(0.0174)	(0.00516)
D(CLT De-icing Fluid Shortage)	0.476**	0.841**	0.327**	0.0604**
	(0.0226)	(0.0176)	(0.0349)	(0.0103)
US Airways Scheduled Arrivals	-4.73e-06	-8.23e-06	1.45e-05	1.79e-05*
	(5.25e-06)	(1.89e-05)	(8.09e-06)	(7.31e-06)
Rainfall (Tenths of Inches)	0.00337**	0.000910**	0.0126**	-0.00166*
	(0.000586)	(0.000287)	(0.000900)	(0.000694)
Rain Squared	-0.000183**	-2.85e-05*	-0.000537**	0.000870**
	(5.14e-05)	(1.22e-05)	(7.73e-05)	(0.000101)
Snow (Inches)	0.0756**	0.102**	0.101**	0.136**
	(0.00375)	(0.00668)	(0.00480)	(0.00858)
Snow Squared	-0.00354**	-0.00712**	-0.00593**	-0.0500**
	(0.000683)	(0.00229)	(0.000642)	(0.00686)
Average Daily Wind (MPH)	-0.00291*	-0.000618	-0.00782**	-0.000624
	(0.00139)	(0.000813)	(0.00181)	(0.000654)
Wind Squared	0.000217**	5.18e-05	0.000535**	7.76e-05
	(7.49e-05)	(4.80e-05)	(9.29e-05)	(4.06e-05)
Constant	0.0362*	0.0170	0.0139	0.00117
	(0.0150)	(0.0106)	(0.0228)	(0.00563)
Observations	1,303	1,303	1,303	1,303
R-squared	0.674	0.745	0.664	0.449

** p<0.01, * p<0.05

Standard errors in parentheses

Sources: Analysis of US Airways operations data; National Climatic Data Center Data Set 3210; wunderground.com; OAG. Data period for January 1, 2008-July 26, 2011.

Notes: D( ) are "dummy variables." US Airways Computer Outages are 6/10/2011, 6/18/2011, 6/19/2011, and 1/29/2009. CLT De-icing Fluid Shortage is January 11, 2011. Weather variables are weighted by scheduled US Airways departures for CLT, PHL, BOS, DCA, LGA, PHX and LAS. Yearly, monthly and day-of-week dummies not shown. US Airways Scheduled Arrivals are for mainline and express. CLT Mainline only includes East pilots.

IV. IMPACT OF DETERIORATING OPERATIONAL PERFORMANCE ON US AIRWAYS' COMPETITIVE POSITION

38. I now discuss how the erosion in US Airways' operational performance has adversely affected the Company's competitive position. US Airways, like all other carriers, carefully tracks the on-time performance of all of its flights. Likewise, the U.S. DOT requires all commercial carriers with at least a one percent share of domestic passenger revenues to report their operational performance for every flight that they operate and this data is widely scrutinized and compared across carriers by the DOT,[41] the media,[42] and researchers alike.[43] Moreover, since the underlying flight-level data is made available to the public, there exists numerous websites allowing consumers to compare the on-time performance of airlines on any particular route.[44] The widespread,

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[41] Each month, the U.S. DOT's Office of Aviation Enforcement and Proceedings publishes its *Air Travel Consumer Report.* As noted on the DOT's website, "[t]he report is designed to assist consumers with information on the quality of services provided by the airlines." The report includes data for each carrier with at least one percent of total domestic scheduled revenue and includes (among other things) carrier specific data on A14 and completion factor. See http://airconsumer.dot.gov/reports/atcr11.htm

[42] See, for example, "Delta ranks near bottom in on-time performance", *The Atlanta Journal Constitution*, February 10, 2011 or "America's Best & Worst Airlines", *Travel & Leisure*, August 2009, noting that *"Arriving on time is important for all sorts of reasons: making a connection; attending a big meeting; or even just starting your vacation on the right foot. And when it comes to on-time arrivals, not all airlines are created equal."*

[43] See, for example, "The Effect of Air Traffic Delays on Airline Prices", Silke Forbes, *International Journal of Industrial Organization*, Volume 26(5), September 2008, pp. 1,216-1,232, "Do Carriers Internalize Congestion Costs? Empirical Evidence on the Internalization Question", Nicholas Rupp, *Journal of Urban Economics*, 2009, 65, pp. 24-37, "Retracting a Gift: How Does Employee Effort Respond to Wage Reductions?" Darin Lee and Nicholas Rupp, *Journal of Labor Economics*, 2007, 25:4, pp. 725-762 and *Airline Quality Rating—2011*, Brent Bowen and Dean Headley, Department of Aviation Technology, Purdue University and Department of Marking, Wichita State University.

[44] See, for example, http://www.flightstats.com/go/FlightRating/flightRatingByRoute.do.

publicly available nature of airline operational performance, results in *relative* operational performance being an important element of competition between carriers.

A. US Airways' Overall Airline Quality Rating Has Gone From Last to First Among Large Network Carriers

39. Each year, Purdue and Wichita State Universities release an *Airline Quality Rating* study based on U.S. DOT data.[45] As demonstrated in Exhibit 17, US Airways ranked worst among the large network carriers (i.e., United, American, Delta, Continental, Northwest and US Airways) in 2004 in terms of overall airline quality as measured by this study. However, because US Airways has invested enormous resources into improving is operational reliability over the past several years,[46] their ranking has improved steadily and in 2010, they ranked *first* among large network carriers.

[45] The Airline Quality Rating ("AQR") is a weighted average of the DOT's data for on-time (A:14) performance, denied boardings, mishandled bags and customer complaints.

[46] See *Declaration of Kerry F. Hester in Support of Plaintiff's Motion for Preliminary Injunction,* paragraph 15.

EXHIBIT 17: RANKING OF LARGE NETWORK CARRIERS IN THE ANNUAL *AIRLINE QUALITY RATING* STUDY, 2004-2010

Rank	2004	2005	2006	2007	2008	2009	2010
1	UNITED	UNITED	nwa	nwa	nwa	nwa	US AIRWAYS
2	nwa	nwa	Continental Airlines	Continental Airlines	Continental Airlines	Continental Airlines	DELTA
3	AA American Airlines	Continental Airlines	UNITED	UNITED	AA American Airlines	US AIRWAYS	Continental Airlines
4	Continental Airlines	AA American Airlines	AA American Airlines	AA American Airlines	US AIRWAYS	AA American Airlines	AA American Airlines
5	DELTA	DELTA	DELTA	DELTA	UNITED	UNITED	UNITED
6	US AIRWAYS	US AIRWAYS	US AIRWAYS	US AIRWAYS	DELTA	DELTA	

* Bowen, Dr. Brent D. and Headley, Dr. Dean E., *Airline Quality Rating 2011*; Bowen, Dr. Brent D. and Headley, Dr. Dean E., *Airline Quality Rating 2010*.
Notes: Northwest does not appear in the 2010 rankings because it merged with Delta.

40. Moreover, as demonstrated in Exhibit 18, since 2008, US Airways' has ranked either first or second among its peers in terms of on-time arrivals within 14 minutes (A:14), the most widely followed metric for operational performance and customer satisfaction. However, since May 2011, US Airways has ranked next to last in terms of on-time arrivals among the large network carriers.

EXHIBIT 18: RANKING OF LARGE NETWORK CARRIERS ON-TIME ARRIVAL (A:14) PERFORMANCE, 2008-2011

Rank	2008	2009	2010	Jan-Apr 2011	Since May 2011*
1	US AIRWAYS	UNITED	UNITED	UNITED	DELTA
2	nwa	US AIRWAYS	US AIRWAYS	US AIRWAYS	Continental Airlines
3	DELTA	nwa	Continental Airlines	DELTA	UNITED
4	Continental Airlines	Continental Airlines	American Airlines	American Airlines	US AIRWAYS
5	UNITED	DELTA	DELTA	Continental Airlines	American Airlines
6	American Airlines	American Airlines			

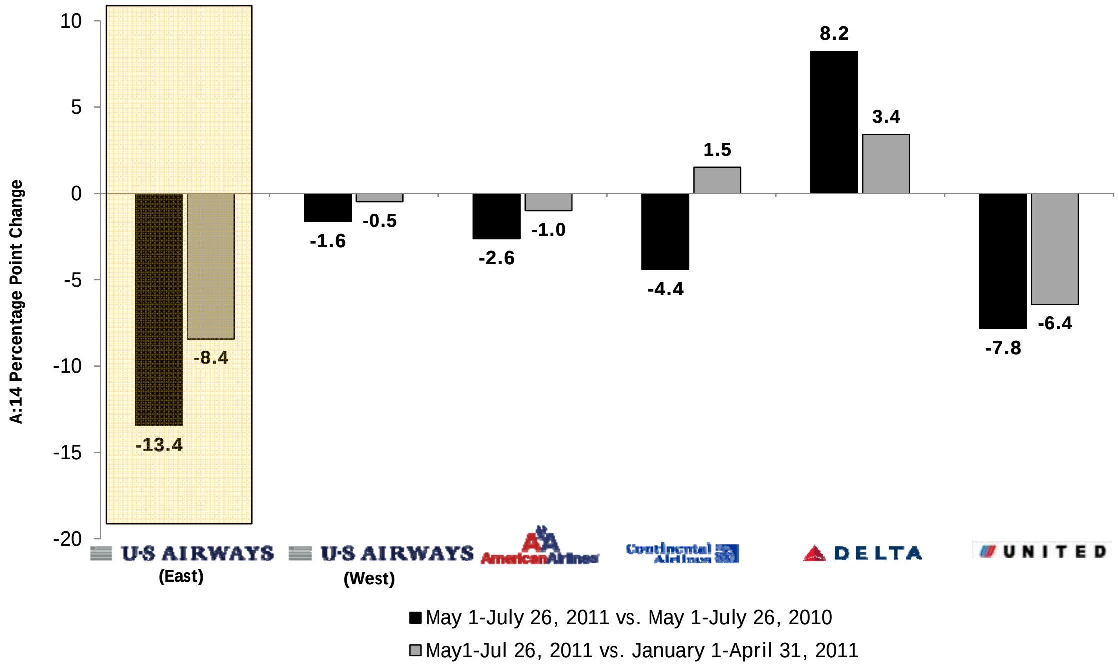
*Data through week ending July 26th.
Source: U.S. DOT, Data Exchange and flightstats.
Notes: Northwest does not appear after 2009 because it merged with Delta.

B. The Spike In Operational Disruptions US Airways' Has Experienced Since May 1st, 2011 Has Jeopardized The Company's Leading Position In Operational Performance

41. As demonstrated in Section III above, US Airways has suffered from a precipitous drop in several measures of operational reliability since the beginning of May. Not only was this drop anomalous from a statistical point of view, it also represents the worst change in operational performance among the large network carriers. Exhibit 19, for example, demonstrates the percentage point change in on-time arrivals (A:14) for the period May 1, 2011 to July 26, 2011 relative to the same period for 2010 as well as to the first four months of 2011. US Airways' East on-time performance declined by 8.4 percentage points for the period May 1st to July 26th of this year versus January-April of this year, substantially more than any other carrier except United (the

grey bars in Exhibit 19). Likewise, US Airways' East year-over-year on-time performance plummeted by 13.4 percentage points (the black bars in Exhibit 19), more than three times as much as any other carrier except United.

EXHIBIT 19: PERCENTAGE POINT CHANGE IN PROPORTION OF FLIGHTS ARRIVING ON-TIME (A:14) OF LARGE NETWORK CARRIERS



Sources: US Airways, U.S. DOT and Data Exchange. June and July data include international flights.

C. Each Minute of Pilot Induced Arrival Delays Results in More Than $53,000 in Harm Due to Forgone Passenger Revenues For US Airways

42. Deteriorating operational performance from pilot actions directly harms US Airways because—all other things equal—passengers will be less likely to choose US Airways instead of other carriers for their travel needs if the Company's sub-par operational performance persists. This passenger "bookaway" will result in less demand for US Airways' services, which in turn will be manifested through lower realized fares.

43. The proposition that a carrier with a poor reputation for on-time performance harms that carrier's competitive position in the marketplace has been studied by academic economists. One recently published peer-reviewed study, for example, found that each additional minute of delay (relative to the mean) is associated with that carrier receiving $1.42 less per non-stop passenger and $0.77 less per connecting passenger.[47]

44. Each day, US Airways' transports—on average—approximately 125,614 domestic origin and destination ("O&D" passengers).[48] Of those passengers, 48,586 either fly non-stop on a US Airways East mainline flight,[49] or, have a final leg of a connecting trip on a US Airways East mainline flight.[50] Of these passengers, slightly more than half (i.e., 52%) are non-stop while the remaining 48% are connecting.

45. Applying the estimated impact of incremental delays from Forbes' 2008 study and the passenger numbers above, it is straightforward to calculate that each minute of incremental delay for US Airways' East operations due to pilot job actions results in $53,826 per day in forgone passenger revenues.[51]

[47] See "The Effect of Air Traffic Delays on Airline Prices", Silke Forbes, *International Journal of Industrial Organization*, Volume 26(5), September 2008, pp. 1,216-1,232.

[48] Source: U.S. DOT DB1B Survey, Second and Third Quarters 2010. Revenue passenger only. Origin and Destinations ("O&D") passengers are counted based on the starting and ending point of their journey, irrespective of where (or if) they make a connection.

[49] For example, a non-stop passenger between Boston and Washington D.C. (DCA) or Charlotte and Denver. Source: U.S. DOT DB1B Survey, Second and Third Quarters 2010.

[50] For example, a passenger flying from Roanoke to Los Angeles with a connection in Charlotte. Source: U.S. DOT DB1B Survey, Second and Third Quarters 2010.

[51] Each minute of East delay results in $35,860 in damages to US Airways from lost revenues for non-stop passengers (i.e., 25,223 × $1.42) and $17,966 in damages to US Airways from lost revenues for connecting passengers (i.e., 23,333 × $0.77).

46. The regression analysis summarized in Exhibit 14 above that controls for daily weather variation, load factor and recent computer outages (among other factors) indicates that pilot actions since May 1st, 2011 have resulted in US Airways' East flights being delayed, on average, by an additional 6.48 minutes. As discussed above, based on published economic studies, each minute of incremental delay for US Airways vis-à-vis its competitors results in approximately $53,000 in lost passenger revenue *per day*. Thus, the cost to US Airways in terms of forgone passenger revenues (should the current level of pilot job actions persist) is approximately $348,000 per day, or approximately $2.4 million per week.

V. OTHER HARM TO US AIRWAYS AND ITS PASSENGERS FROM PILOT ACTIONS

47. In addition to forgone revenues resulting from deteriorating operational performance attributable to pilot actions, US Airways and its passengers have also incurred additional harm as a result of pilot actions. Additional sources of harm include (but are not limited to): (a) added fuel, maintenance and wage costs arising from prolonged taxi times, (b) costs borne by the Company associated with "misconnected" bags and passengers due to the increased rate of flight delays attributable to pilot actions, and (c) passenger inconvenience costs from delayed and/or cancelled flights and missed connections attributable to pilot actions.

A. Each Minute of Pilot Induced Taxi Time Delay Increases Costs by Approximately $19,000 Per Day

48. As discussed above in Section III.D, taxi times (both out and in) for US Airways East operations deteriorated sharply starting after May 1st, 2011. In addition to contributing to delays, prolonged taxi times also result in higher costs to the Company. These costs include unnecessary fuel burn, wage costs for both pilots and flight attendants,[52] and engine maintenance costs.[53] US Airways estimates the cost of each additional taxi minute to be approximately $9.62 for its smallest narrowbody East aircraft (the Embraer-190), $14.43 for the Airbus A319/A320/A321s and the Boeing 737, $19.24 for the Boeing 757, $21.65 for the Boeing 767 and $26.46 for the Airbus A330.[54] The departure weighted average taxi cost per minute for US Airways' East operations is $14.76/minute.

49. As summarized in Exhibit 13 above, a regression analysis of taxi times that controls for daily weather and other factors indicates that pilot actions since May 1st, 2011 have resulted in an average increase of 0.90 minutes of East Taxi-out time and 0.63 minutes

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[52] US Airways' pilots and flight attendants are compensated based on total block time (i.e., the sum of taxi out, flight time and taxi in times) adjusted for various contractual provisions. Thus, each additional minute of unnecessary taxi time results in additional wage costs for the Company.

[53] US Airways pays engine manufacturers (such as GE or Rolls Royce) a set rate to cover maintenance costs for each hour an engine is within use, regardless of whether or not the aircraft is in flight or taxing. These arrangements are often referred to throughout the industry as "power by the hour" maintenance contracts. See *Declaration of Kerry F. Hester in Support of Plaintiff's Motion for Preliminary Injunction*, paragraph 18.

[54] See *Declaration of Kerry F. Hester in Support of Plaintiff's Motion for Preliminary Injunction*, paragraph 17.

of East Taxi-in time. Based on the weighted average East taxi cost of $14.76/minute and the average number of East mainline flights of 835 per day, the combined average incremental taxi time attributable to pilot actions since May 1st, 2011 of 1.53 minutes results in $18,801 of additional costs to the Company each day (or more than $131,000 per week). Thus, since May 1, slow taxing by East pilots has resulted in incremental taxi costs of approximately $1.7 million.

B. US Airways Has Incurred Significant Costs From Increased Baggage and Passenger Misconnections Attributable to Pilot Caused Delays

50. Flight delays increase the probability that connecting passengers and their checked luggage fail to make their connecting flight. When passengers or checked luggage fail to make their connecting flights, US Airways can incur additional costs. Although many passengers that miss their connections can be rebooked on a later flight the same day with minimal direct costs to the Company,[55] US Airways may need to provide various forms of compensation for passengers with longer delays due to a missed connection such as meal vouchers, additional frequent flyer miles or flight vouchers to be used on a future flight. Likewise, US Airways may need to incur the costs of hotel accommodations and ground transportation for passengers who miss the last connecting flight of the day to their final destination due to a flight delay. Finally, in some instances, US Airways may need to pay the costs of re-accommodating passengers who have missed their connections on another airline.

[55] Although US Airways may not suffer any direct costs from such passenger misconnects, as discussed above, carriers with poor service quality (i.e., on-time performance, etc) realize lower average fares.

51. In order to assess how pilot-caused delays have impacted the reliability of baggage connections, I estimate the same regression model used in Section III E (arrival delays), but using the number of mishandled bags per 1,000 connecting passengers as the dependant variable.[56] I estimate the model separately for each of US Airways three hubs (airports where a substantial proportion of passengers are making a connection): Charlotte, Philadelphia and Phoenix. As with the previous regressions presented in this report, the estimated coefficient on **D(post-May 1)** reflects the incremental impact of pilot actions since May 1st on the dependent variable (here, mishandled bags per 1,000 connecting passengers), holding all other variables fixed.[57] Column (1) of Exhibit 20 shows that pilot actions since May 1st have resulted in an increase of 5.2 mishandled bags per thousand connecting passengers at Charlotte (the Company's largest connecting airport), but has not resulted in a statistically significant increase at either Philadelphia or Phoenix.[58]

[56] Because of the shorter period of data for the mishandled baggage data set, I have also dropped the year dummy variable.

[57] Although the underlying mishandled baggage data collected by the Company does not distinguish between bags that missed connections due to late flights versus other sources (i.e., bags that are accidently loaded onto the wrong flight, etc.) there is no reason to believe there would be a systematic change in these "random" sources of mishandled bags since May 1st. Thus, the estimated coefficient on **D(post-May 1)** from Exhibit 20 can be interpreted as the increase in misconnected bags due to pilot actions.

[58] During the "control" period of October 4, 2009 to Date April 30th, 2011, there was an average of 11.59 mishandled bags per thousand connecting passengers at Charlotte. Thus, an increase of 5.2 mishandled bags per thousand connecting passengers represents an increase of approximately 45%.

EXHIBIT 20: MISHANDLED BAG REGRESSION RESULTS

	(1)	(2)	(3)
	Mishandled Bags Per Thousand Connecting Passengers	Mishandled Bags Per Thousand Connecting Passengers	Mishandled Bags Per Thousand Connecting Passengers
	CLT	PHL	PHX
D(post-May 1)	5.203**	2.311	0.331
	(1.001)	(4.578)	(0.322)
D(Computer Outages)	16.99**	10.57	0.786
	(2.840)	(13.59)	(0.962)
D(CLT De-icing Fluid Shortage)	306.3**	-20.65	6.326**
	(4.960)	(23.66)	(1.641)
Load Factor	0.282**	0.794**	0.137**
	(0.0509)	(0.198)	(0.0155)
US Airways Scheduled Arrivals	0.00227	0.0259	0.0293**
	(0.00734)	(0.0472)	(0.00429)
Rainfall (Tenths of Inches)	1.688**	2.178**	0.826**
	(0.193)	(0.687)	(0.165)
Rain Squared	-0.0750**	-0.0648	-0.0245
	(0.0139)	(0.0365)	(0.0172)
Snow (Inches)	19.38**	12.56**	4.148
	(2.258)	(2.423)	(3.490)
Snow Squared	-2.599**	-0.612**	-6.328
	(0.843)	(0.152)	(6.885)
Average Daily Wind (MPH)	0.202	-1.067	-0.181
	(0.294)	(1.102)	(0.126)
Wind Squared	0.00370	0.101*	0.0194*
	(0.0179)	(0.0499)	(0.00769)
Constant	-10.66*	-31.05	-10.65**
	(4.806)	(22.61)	(1.505)
Observations	657	655	657
R-squared	0.891	0.242	0.533

** p<0.01, * p<0.05
Probabilities in parentheses

Sources: Analysis of US Airways operations data, US Airways; National Climatic Data Center Data Set 3210; wunderground.com; OAG. Data period is October 4, 2009 - July 24, 2011.
Notes: D( ) are "dummy variables." US Airways Computer Outages are 6/10/2011, 6/18/2011, 6/19/2011, and 1/29/2009. CLT De-icing Fluid Shortage is January 11, 2011. Weather variables are weighted by scheduled US Airways Departures for CLT, PHL, BOS, DCA, LGA, PHX and LAS. US Airways Scheduled Arrivals are mainline and express. Monthly and day-of-week dummies not shown. May 18 and May 28 have been removed because of missing data.

52. US Airways estimates that the costs associated with each mishandled piece of checked luggage is approximately $50.[59] Based on the estimated increase in the rate of Charlotte mishandled bags attributable to pilot actions of 5.2 per thousand connecting passengers and an average daily number of Charlotte connecting passengers of 37,863, I estimate that pilot actions have added approximately $10,000 per day to US Airways costs solely as a result of mishandled bags. Thus, since May1, East pilot actions have led to over 17,000 misconnected bags, imposing more than $856,000 in incremental mishandled baggage costs on the Company.

53. A logical next step would be to estimate an equivalent regression model for missed passenger connections to test whether pilot actions since May 1st have also resulted in increased numbers of passengers failing to make their connections. However, limitations in US Airways' current internal databases prevent one from reliably conducting such an analysis.[60] Nevertheless, based on the large and statistically significant increase in the number of mishandled bags at CLT attributable to pilot actions, it is reasonable to assume that there has also been a commensurate increase in the number of passengers who have missed their connections due to pilot induced

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[59] See *Declaration of Kerry F. Hester in Support of Plaintiff's Motion for Preliminary Injunction*, paragraph 19.

[60] It is my understanding that US Airways' current passenger misconnection database does not accurately capture all passengers failing to make their connections. In particular, the Company's database does not include passengers who were proactively re-accommodated by the Company. For example, if US Airways re-books a passenger's second (connecting) flight because his or her's first flight is delayed *before the first flight departs or while that passenger's first flight is en-route*, this "misconnect" would not be included in the data, even though the passenger has been inconvenienced.

flight delays. Since US Airways estimates that each misconnected passenger costs the Company, on average, $452.93,[61] even a small increase in the number of passenger misconnections per day attributable to delays due to pilot actions would result in substantial additional costs to the Company.

54. In aggregate, the harm to US Airways from forgone passenger revenues due to deteriorating operational performance, additional taxi-related costs and additional mishandled baggage costs—should the current level of pilot job actions persist—amount to approximately $377,000 per day.[62]

C. US Airways' Passengers Have Suffered Substantial Harm As A Result of Pilot Job Actions

55. As discussed above, pilot actions have resulted in a substantial worsening of US Airways' operational performance, including longer flight delays and more frequent flight cancellations to the detriment of US Airways passengers. For example, although the *average* increase in East flight delays attributable to pilot actions is 6.4 minutes, some flights (and their passengers) have been forced to endure substantially longer delays due to pilot actions. Similarly, as demonstrated above in Exhibit 16, pilot actions since May 1st have resulted in more than one percent of all East flights being cancelled. Based on an average of 835 daily East mainline departures, an average of nine to ten flights are cancelled each day as a result of pilot actions, which impacts an

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[61] See *Declaration of Kerry F. Hester in Support of Plaintiff's Motion for Preliminary Injunction,* paragraph 20.

[62] Moreover, this figure is conservative since it does not include costs related to the increased number of passenger misconnections for reasons described above.

average of 1,173 passengers each day, or approximately 105,000 passengers since May 1st, 2011.

VI. CONCLUSIONS

56. In sum, it is my opinion that the dramatic increase in several pilot behavior measures (e.g., maintenance write-ups, pilot induced departure delays and cancellations, prolonged taxi times) that US Airways has experienced since May 1st among its East pilots are the result of a concerted job action among East pilots to disrupt the Company's operations and are not the result of random statistical variation. Likewise, it is my opinion that the statistically significant elevated level of these actions—which is not present for the Company's West pilots—is the cause of the Company's deteriorating operational performance. Moreover, if the current levels of operational performance persist, not only will US Airways' passengers be further inconvenienced, the Company will suffer substantial harm both in terms of lower passenger revenues and additional costs.

Darin N. Lee
July 29, 2011

APPENDIX A: CURRICULUM VITAE

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1) "Alliances, Codesharing, Antitrust Immunity and International Airfares: Do Previous Patterns Persist?", with Jan K. Brueckner and Ethan Singer. ***Journal of Competition Law & Economics***, Forthcoming.

2) "Retracting a Gift: How Does Employee Effort Respond to Wage Reductions?", with Nicholas Rupp, ***Journal of Labor Economics***, Volume 25, Number 4, October 2007, pages 725-762.

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UNIVERSITY OF COLORADO-DENVER, Department of Economics, 1994 and 1995,
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PROFESSIONAL ENGAGEMENTS

Testimony & Expert Reports

- Expert testimony in the arbitration matter between US Airline Pilots Association and US Airways, Inc., In re: Transition Agreement Disputes No 10. April 2011.
- Merits and Class Certification Expert reports and deposition testimony in Delta/AirTran Baggage Fee Antitrust Litigation, Civil Action File Number 1:09, md-2089-TCB, United States District Court, Northern District of Georgia, Atlanta Division, 2010-2011.
- Expert submission in The Matter of an Arbitration Between Callahan Construction Company, Ltd. and Others. Vancouver, British Columbia, August 2010.
- Expert testimony in the arbitration matter between US Airline Pilots Association and US Airways, Inc., In re: Transition Agreement Disputes Nos. 12, 13 and 14. April 2010.
- Expert report in the matter of Mesa Air Group, Inc. and Freedom Airlines v. Delta Air Lines, Inc. In the United States District Court For The Northern District of Georgia, Atlanta Division. Civil Action File, No. 1:09: CV-0772-ODE. January 2010.
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- Expert report in the matter of United Air Lines vs. Air Line Pilots Association, et. al, No. 08 CV 4317, United States District Court, Northern District of Illinois, Eastern District. (Joint with Daniel M. Kasper)
- Expert declaration in the matter of Congestion Management Rule for John F. Kennedy International Airport and Newark Liberty International Airport, U.S. Department of Transportation Docket No. FAA-2008-0517. (Joint with Daniel M. Kasper)
- Expert declaration in the matter of Congestion Management Rule for LaGuardia Airport, U.S. Department of Transportation Docket No. FAA-2006-25709. (Joint with Daniel M. Kasper)

- Expert report, deposition and trial testimony in Gary H. Ramey, et. al vs. District 141, International Association of Machinists and Aerospace Workers, et. al. United States District Court, Eastern District of New York, 2007.
- Expert report in Republic/NFR & C. Parking of Louisville v. Regional Airport Authority of Louisville and Jefferson County, Civil Action No. 3:01CV-633-S.
- Expert declaration in Star Alliance Application for Antitrust Immunity, Before the U.S. Department of Transportation, Dockets OST-05-22922, OST-96-1434. (Joint with Daniel M. Kasper)
- Expert testimony in SkyTeam Application for Antitrust Immunity, Before the U.S. Department of Transportation, Docket No OST-2004-19214. (Joint with Daniel M. Kasper)

Airline Labor Matters: *Dr. Lee is an expert in labor matters regarding the airline and related industries. Representative engagements include:*

- For several major U.S. airlines (both mainline and regional), provided expert analysis regarding labor negotiations in advance of Chapter 11 bankruptcy as well as analyses in conjunction with Section 1113(c), 1113(e) and 1114 contract relief.
- For several major U.S. passenger and cargo airlines, provided expert analysis and testimony in a variety of labor arbitrations.
- Analysis of the impact of a potential pilot strike on a major US airline and local economies.
- For a major U.S. airline, provided expert analysis regarding seniority integration issues.
- For a large airline union, provided independent expert testimony in class action lawsuit brought forth by a class of its members regarding effects of September 11th on U.S. airline industry.
- For an international airline caterer, provided expert analysis in contract interest arbitration.
- For several major U.S airlines, provided expert analysis in forced majeure labor arbitrations.
- For a major U.S. carrier, analysis of industry & economic issues in conjunction with Presidential Emergency Board regarding pilot negotiations.

Airline Economics, Competition Policy, and Financial Damages: *Dr. Lee is an expert in the airline industry and has in-depth knowledge of the economics of the airline industry, airline data, airline ticket distribution, regulatory and competition policy issues. Representative case experience includes:*

- Expert consulting to United Airlines for United/Continental merger, including presentation of econometric analysis of pricing effects from merger to the U.S. Department of Justice.
- Provide expert consulting services to several major U.S. mainline and regional airlines in connection with Chapter 11 reorganization.
- Expert testimony and econometric analysis of on-time flight performance.
- Provide expert testimony and analysis for international airline alliances in support of antitrust immunity applications.
- Analysis of industry, economic & antitrust issues on behalf of three major U.S. airlines and industry group in class action suit regarding hidden city ticketing.
- Provided valuation of a major carrier's U.S. slot holdings.
- Provided valuation of a major carrier's Narita slots holdings and route authority.
- Comments on behalf of industry airline association regarding the use of market based mechanisms to reduce delay and congestion at U.S. airports.
- Analysis of industry, economic & antitrust issues on behalf of a major U.S. airline regarding the use of baggage templates at Dulles International Airport. (U.S. District Court for the Eastern District of Virginia, Civil Action No. 00-684-A).
- Provide consulting services to major industry group with regards to slot auctions and congestion pricing.
- Analysis of proposed rule making regarding demand management options at New York's LaGuardia airport.
- Industry analysis for major airline in conjunction with post 9/11 workforce reductions.
- Analysis of industry & economic issues on behalf of industry backed Internet travel agency.
- Analysis of industry & economic issues for major U.S. and European alliance partners regarding a potential immunized alliance and Open Skies.

- Analysis of discriminatory airport rates, charges and access fees by U.S. and Canadian airports for air carriers and ground transportation providers.
- Authored whitepaper on behalf of major U.S. airline in support of codesharing application with major Hong Kong airline.
- Analysis of industry & economic issues on behalf of Chamber of Commerce for a U.S. metropolitan hub city.
- Analysis of consolidation strategies for a major U.S. airline in conjunction with the proposed and realized industry mergers of 2001.
- Analysis of industry, economic & antitrust issues on behalf of United Air Lines in *United Air Lines v. Mesa Airlines and Westair Commuter Airlines.* (United States District Court for the Northern District of Illinois Eastern Division, No. 97 C4455).
- Analysis of industry, economic & damage issues on behalf of GATX/Airlog in *GATX/Airlog v Evergreen International Airlines, Bank of New York, AIA, and G.E. Capital*. (U.S. District Court, Oakland Division, No. C96-2494CW).
- Analysis of industry and economic issues on behalf of American Airlines regarding application for new service to China.
- Analysis of industry & damage issues for ValuJet/AirTran is *ValuJet/AirTran vs Sabreliner and SabreTech*. (Circuit Court of St. Louis County, State of Missouri #97CV-003725)
- Analysis of industry & economic issues for a major U.S. airline in predatory pricing suit.
- Analysis of industry & economic issues for a major U.S. airline in response of allegations of hub dominance.
- Analysis of industry, regulatory and economic issues for a major U.S. airline and Canadian holding company during negotiations regarding the potential acquisition of Canadian Airlines.

Auctions and Markets: Dr. Lee also specializes in the auctions, markets and game theory. He has served as Chief Auction Strategist for numerous wireless telecommunication and Internet firms during spectrum auctions in the US, UK, Nigeria, Egypt, Brazil and Switzerland where he was responsible for rules analysis, development of bidding strategies, and round-by-round analysis of bidding behavior. Dr. Lee has also provided auction advice to firms in the electricity, airline and diamond industries and has published articles on auctions and game theory in policy journals such as *Telecommunications Policy* as well as leading economic journals such as the *Journal of Mathematical Economics* and *Economics Letters*. Representative engagements include:

- Chief auction strategist for a Google in FCC Auction #73, 2007-2008.
- For a U.S. wireless telecommunications firm (2006): Chief auction strategist during FCC auction #66 (AWS).
- For a major auction software company (2006): Provided logic and software beta testing for Illinois electric capacity auction software.
- For MTN of South Africa (2006): Chief auction strategist during Egyptian Mobile License Auction.
- For a major auction software company (2002): Analyzed rules and tested software for Texas Electricity Capacity auction.
- For an industry group representing major U.S. Airlines (2001-2003): Consulting services on the feasibility of airport take-off and landing slot auctions.
- For a major producer and market maker of diamond rough (2001-2002): Consulting services on pricing, auctions, and market microstructure.
- For a major U.S. Electric Utility (2001): Auction Design Consultant, Basic Services Generation Auction (New Jersey)
- For MTN of South Africa (2000/2001): Principal Auction Strategist, Nigerian GSM auction.
- For an international telecommunications firm (2000): Principal Auction Strategist, UK LMDS auction.
- For an international telecommunications firm (1999-2000): Principal Auction Strategist, UK 3G auction.
- Provided analysis of the "winner's curse" in U.S. vs. Nextwave bankruptcy settlement (U.S. C-block auction). (1999)
- Advised the Colombian government on efficient auction design for PCS service. (1998)
- Provided bid strategy advice to bidder in the Brazil B block auction (1998)

CONFERENCE AND OTHER INVITED PRESENTATIONS

- University of Vigo, Spain, July 2011.
- International Industrial Organization Conference, Boston, April 2011.
- Invited speaker at American Bar Association, Section of Public Utility, Communications and Transportation Law: An Update on Competition Analysis in Regulated Industries. Washington, D.C., March 7, 2011.
- Hamburg Aviation Conference (invited speaker), Hamburg Germany, February 11, 2010.
- Embraer Semi-Annual AMA's Meeting (invited speaker), Sao Jose dos Campos, Brazil, May 29, 2007.
- International Industrial Organization Conference, Atlanta, April 2005.
- American Economic Association Winter Meetings, Philadelphia, January 2005.
- International Industrial Organization Conference, Chicago, April 2004.
- Southern Economics Association Annual Conference, San Antonio, November 2003.
- Federal Reserve Bank of Chicago (invited speaker), June 2003.
- International Industrial Organization Conference, Boston, April 2003.
- Stony Brook International Game Theory Conference, July 1997

Conference Service:

- Session Organizer and Chair, International Industrial Organization Conference, Boston, April 2011.
- Session Chair, International Industrial Organization Conference, Atlanta, April 2005.
- Session Organizer and Chair, American Economic Association Meetings, Philadelphia, January 2005.
- Session Organizer and Chair, International Industrial Organization Conference, Chicago, April 2004
- Discussant, International Industrial Organization Conference, Boston, April 2004
- Discussant, Southern Economics Association Conference, San Antonio, November 2003

- Discussant, International Industrial Organization Conference, Boston, April 2003

Journal Referee For:

Journal of Industrial Economics, Review of Economics and Statistics, Southern Economic Journal, Journal of Law, Economics & Organization, Review of Industrial Organization, Journal of Urban Economics, Journal of Transport Economics and Policy, Telecommunications Policy, Journal of Air Transport Management

PROFESSIONAL AFFILIATIONS

Sloan Industry Studies Affiliate

HONORS AND AWARDS

Abramson Dissertation Prize, Department of Economics, Brown University, 1997
Stephen Ehrlich Foundation Research Grant, Brown University, 1997
Stephen Ehrlich Foundation Research Grant, Brown University, 1996

APPENDIX B: LIST OF DOCUMENTS AND INFORMATION SOURCES CONSIDERED

PUBLICLY AVAILABLE DATA AND DOCUMENTS

1. *Statistical Inference*, George Casella and Roger Berger, Belmont CA: Wadsworth & Brooks Cole, 1990.

2. OAG Schedule Data.

3. U.S. DOT DB1B Survey Data.

4. National Climatic Data Center Data Set 3210.

5. wunderground.com (additional weather data).

6. http://www.flightstats.com/go/FlightRating/flightRatingByRoute.do.

7. Airline Quality Rating—2011, Brent Bowen and Dean Headley, Department of Aviation Technology, Purdue University and Department of Marking, Wichita State University

8. "The Effect of Air Traffic Delays on Airline Prices", Silke Forbes, *International Journal of Industrial Organization*, Volume 26(5), September 2008, pp. 1,216-1,232.

9. "Do Carriers Internalize Congestion Costs? Empirical Evidence on the Internalization Question", Nicholas Rupp, *Journal of Urban Economics*, 2009, 65, pp. 24-37.

10. "Retracting a Gift: How Does Employee Effort Respond to Wage Reductions?" Darin Lee and Nicholas Rupp, *Journal of Labor Economics*, 2007, 25:4, pp. 725-762.

11. "Network Effects, Congestion and Air Traffic Delays: Or Why Not All Delays Are Evil", Christopher Mayer and Todd Sinai, *American Economic Review*, Vol. 93, No. 4 (2003), pp. 1194-1215.

12. "Does Competition Influence Airline On-Time Performance?", by Nicholas Rupp, Douglas Owens and L. Wayne Plumly, Chapter 11 in *Advances in Airline Economics, Volume 1,* Darin Lee, Editor, Elsevier, 2006, pp.247-268.

13. "Delta ranks near bottom in on-time performance", The Atlanta Journal Constitution, February 10, 2011

14. “America’s Best & Worst Airlines”, *Travel & Leisure*, August 2009.

15. U.S. DOT Air Travel Consumer Reports, available at: http://airconsumer.dot.gov/reports/index.htm

16. “US Airways Pilots Speak Out About Safety Conditions at the Airline”, May 9, 2011, available at: http://usairlinepilots.org/index.php?option=com_content&view=article&id=8022:us-airways-pilots-speak-out-about-safety-conditions-at-the-airline&catid=271:press-releases&Itemid=331.

USAPA DOCUMENTS

17. Safety Committee Operational Guidance, USAPA.

18. Report on Results from the Safety Culture Indicator Scale Measurement System, Illumia Corporation, December 2010, Part II.

US AIRWAYS DECLARATIONS, DOCUMENTS AND DATA

19. Declaration of Kerry F. Hester in Support of Plaintiff’s Motion for Preliminary Injunction.

20. Declaration of Lyle Hogg in Support of Plaintiff’s Motion for Preliminary Injunction.

21. Mishandled Baggage Ratio (MBR) Reporting Overview, US Airways presentation.

22. Operations Planning & Analysis Mishandled Bag Cost Calculator – 5/25/2011.

23. OMMdaily20110525_Historical_With 2008-2009 DOT MBR.csv

24. OMMdaily20110726.csv

25. LoadFactor_2008 thru 20110711.xls

26. LoadFactorMTD_20110726.xls

27. DailyPIREPData01JAN08-25MAY11-EWTYPE.xls

28. DailyPIREPData26MAY11-01JUN11-EWTYPE.xls

29. DailyPIREPData02JUN11-EWTYPE.xls

30. DailyPIREPData03JUN11-05JUN11-EWTYPE.xls

31. DailyPIREPData06JUN11-08JUN11-EWTYPE.xls

32. DailyPIREPData11JUL11-14JUL11-EWTYPE.xls

33. DailyPIREPData15JUL11-18JUL11-EWTYPE.xls

34. DailyPIREPData19JUL11-23JUL11-EWTYPE.xls

35. DailyPIREPData24JUL11-26JUL11-EWTYPE.xls

36. STATS_BY_DAY_EXPRESS_EAST_WEST_01JAN08_16MAY11.xls

37. OpsDataMTD_20110531.xls

38. OpsDataMTD_20110630.xls

39. OpsDataMTD_20110726.xls

40. Pilot Fatigue Report.xls

41. Pilot Fatigue Report (Jul 2-25).xls

42. Delays FP0FP4FL1MT6 from 2008 to 20110511.xls

43. PilotCancels.xls

44. DelaysCancelsMTD_20110531.xls

45. DelaysCancelsMTD_20110630.xls

46. DelaysCancelsMTD_20110726.xls

47. WeeklyCompetitives_01Jan2008_25May2011.xls

48. A14_D0 US_DOTdataThru20110525.xls

49. Competitives_June_July_2011.xls

50. Competitives_WE7062011.xls

51. Competitives_WE07132011.xls

52. Competitives_WE07202011.xls

53. Captains Added Fuel.xls

54. 2008 East Pilot Sck Avg by Equipment-Position (Updates).xls

55. 2008 West Pilot Sck Avg by Equipment-Position (Updates).xls

56. 2009 East Pilot Sck Avg by Equipment-Position (Updates).xls

57. 2009 West Pilot Sck Avg by Equipment-Position (Updates).xls

58. 2010 East Pilot Sck Avg by Equipment-Position (Updates).xls

59. 2010 West Pilot Sck Avg by Equipment-Position (Updates).xls

60. 2011 East Pilot Sck Avg by Equipment-Position (Updates).xls

61. 2011 West Pilot Sck Avg by Equipment-Position (Updates).xls

CERTIFICATE OF SERVICE

I hereby certify that the foregoing **EXPERT REPORT OF DARIN N. LEE, PH.D. IN SUPPORT OF PLAINTIFF'S MOTION FOR PRELIMINARY INJUNCTION** was served on Defendants United Airlines Pilots Association and Michael J. Cleary by depositing a copy with the United States Postal Service, certified mail, return receipt, postage prepaid, addressed to the following:

US Airline Pilots Association
c/o Michael J. Cleary
26-A Cedar Point Road
Durham, NH 03824

Michael J. Cleary
26-A Cedar Point Road
Durham, NH 03824

and on Defendant United Airlines Pilots Association via hand delivery to the following address:

US Airline Pilots Association
200 East Woodlawn Road, Suite 250
Charlotte, North Carolina 28217-2207

This the 29th day of July, 2011.

/s/ Robert R. Marcus
Robert R. Marcus
Attorney for Plaintiff