AIRLINE SCHEDULE VERACITY
A CANADA-US COMPARISON

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Introduction

In the United States, there is a regulatory requirement for major commercial air carriers to report their on-time performance data to the federal government for domestic (US to US) flights. These data are made available to travel agents and the traveling public. In the late 1970's and early 1980's, the Aviation Statistics Centre of Statistics Canada produced an "On-Time Performance Report" which was used as an internal document by the Air Transport Committee, Canadian Transport Commission. On a monthly basis it ranked major scheduled service air carriers (both Canadian and foreign) by the percentage of passengers on-time for flight arrivals by sector, by city-pair. There was no public dissemination of the data. There is at present no official Canadian government sanctioned measurement of on-time performance.

If air carriers attempt to maintain or improve their on-time performance, their operational procedures to enable this could affect more markets than just those covered by the statistical reporting. As American carrier on-time performance is measured and published in the US, US carriers may have instituted operational procedures to allow them to keep close to their schedule to avoid bad on-time performance ratings and possible negative implications for bookings. If these operational procedures were in use for all flights, not just domestic ones, one might think that they would score better than Canadian carriers who have no official measurement of their on-time performance. This paper examines the following issues. Do American air carriers behave differently from Canadian air carriers with respect to the on-time performance of scheduled flight departures? Are there differences in on-time performance in markets

where both Canadian and US carriers operate? Are there differences in on-time performance between major and affiliate/feeder carriers?

This study examined only scheduled service flight departures to the United States from Toronto Pearson International Airport [Toronto Pearson] for the month of May 2007. This amounted to over 6600 flight departures. Two data sources are used for this paper: custom data selections from the OAG (Official Airline Guide) and Statistics Canada's Aircraft Movement Statistics Survey.[1] May was chosen in an attempt to avoid weather extremes (snow, thunderstorms) in winter or summer months that could affect on-time performance. There is a risk that May is not a representative month, however, so future research using a longer time frame is advised.

In the United States, the Bureau of Transportation Statistics' Office of Airline Information releases data on on-time performance for flights that occur within the United States.[2] These are based on the airlines' scheduled time of departure/arrival and the time that the aircraft departs/arrives at the airport gate. As there can be delays after a flight leaves the gate and actually departs, they also have a data series on "taxi-out" time defined as the "time elapsed between departure from the origin airport gate and wheels off".[3]

Flight Departures

Why are scheduled departure times important? "When" is one of the key variables in consumer flight decision-making after "where to" and "how much". The time of departure also typically is used in the ordering of flight options in queries put to flight reservation systems by either travel agents or consumers.

The two busiest scheduled departure times at Toronto Pearson in May 2007 were 8:30 and 18:10. This makes sense as these capture the morning and evening peaks. Of the 31 days in May 2007, the 23 weekdays had 21 flights scheduled to depart at 8:30 in the morning. Of the 31 days in May, 25 days had 20 flights scheduled to depart at 18:10 in the evening. Not having 20 flights scheduled to depart were the four Saturdays, Sunday the 27th and Wednesday the 30th. These

numbers of flights are exaggerated in the scheduled data by the presence of joint flights operated by one carrier but with multiple flight numbers.

As on-time performance data are not reported to the Canadian government, an indicator of on-time performance was derived. The analysis in this paper was limited to flight departures from Toronto Pearson where the destination of the next stop was in the United States. Charter and cargo only flights were out of scope. There were 6,648 records examined with 3,817 (57%) flown by Canadian carriers and 2,831 (43%) flown by US carriers. Of these, Canadian affiliate/feeder flights amounted to 1,883 while the American affiliate/feeders were 1,730 flights. Aircraft Movement Statistics survey data were matched to OAG schedule data to derive the indicator. For each departing Aircraft Movement Statistics record there was only one matched OAG record. (See Appendix A for an explanation of the handing of code-share flights with multiple OAG records for one actual flight departure).

Although in the United States on-time performance data are released on a carrier specific basis, this study releases only aggregate data.

On-Time Performance Differences by Carrier Nationality

The question posed in this study is "Have procedures put in place by American carriers to improve their on-time performance influenced the on-time performance of their transborder flights?"

In the United States, domestic (flights involving an origin and a destination in the United States) on-time performance data are made available to the public by the Bureau of Transportation Statistics. There is no equivalent government sanctioned statistical program in Canada so the data used in this study were derived.

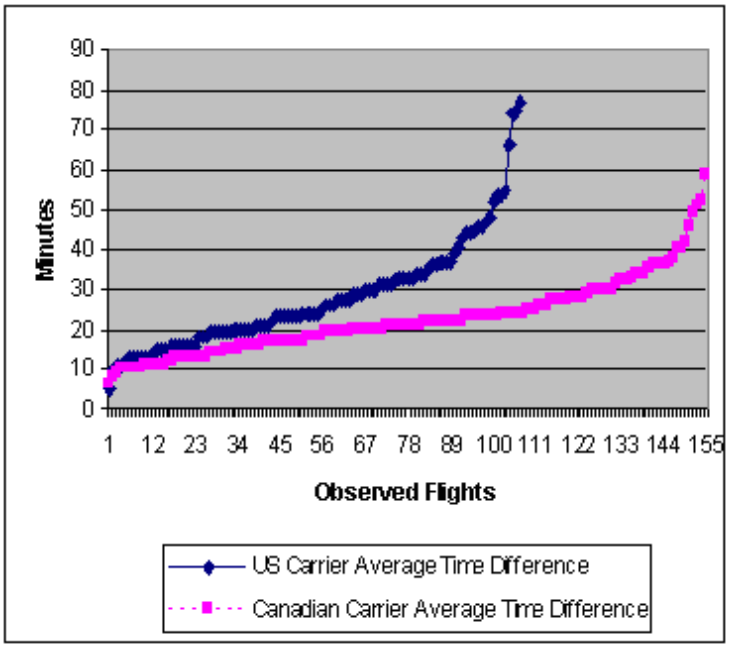
The 6,648 departures examined from May 2007 were the result of 262 different flight numbers where the flight number of the operating carrier was used for flights. Flights that were code-share flights with multiple flight numbers were counted as a single flight using the

flight number of the operating carrier. Of these 262 flights, 59% were by Canadian carriers and 41% were by US carriers.

The OAG scheduled departure data record the scheduled time for the departure at the airport gate while the Aircraft Movement Statistics survey data record the wheels off time (when the plane wheels lift-off the runway). This means that there typically will be a difference between the two times even for a flight that departs on-time.

The average time lag between the scheduled departure time and the wheels off time was calculated for the 262 different flight numbers. The distribution, based on carrier nationality is shown in Chart 1. While there were more Canadian carrier flights than American carrier flights, the average difference between the scheduled departure time and the observed take-off time was smaller for the Canadian carrier flights than those conducted by the American carriers.

Chart 1 Distribution of observed flights time difference (between scheduled departure and take off) by carrier nationality, Toronto Pearson International Airport, May 2007



Source: OAG special selection and Statistics Canada's Aircraft Movement Statistics Survey

The time difference or time lags between the scheduled and take-off times were categorized by time ranges and the results are shown in Table 1. For all categories where the time lag was 25 minutes or less, Canadian carriers accounted for a higher proportion of the flights than their overall proportion. For flights where the lag was 26-30 minutes, the flight proportions matched the 59% by Canadian carriers and 41% by US carriers. For all categories where the time lag was 31 minutes or more, US carriers were overrepresented.

Table 1 suggests that US carriers, whose domestic on-time performance is published, may have performed poorer in the Canada-United States transborder markets than Canadian carriers. This would suggest that whatever procedures they had put in place to enhance on-time performance domestically did not appear to extend to their transborder flights.

Table 1 Average time lag between gate departure and runway departure, by nationality, Toronto Pearson International Airport, May 2007

Time lag	Canadian carrier flights %	US carrier flights %
<= 15 minutes	68	32
16-20 minutes	65	37
21-25 minutes	68	32
26-30 minutes	**59**	**41**
31-35 minutes	43	57
36-40 minutes	53	47
41-45 minutes	17	83
46-50 minutes	33	67
51-55 minutes	33	67
>= 56 minutes	20	80

Source: OAG special selection and Statistics Canada's Aircraft Movement Statistics Survey

Differences in Markets with Canadian-US Carrier Competition

By looking at the flights in isolation from the markets served, however, Table 1 may be somewhat misleading. If one examines markets, based on the next airport of the flight after departing Toronto, in May 2007, there were 47 different transborder markets:

- 23 markets had only Canadian carriers operating;
- 4 markets had only US carriers operating;
- 20 markets had both Canadian and US carriers operating.

The 20 markets (based on the destination of the flight stage leaving Toronto, not necessarily the final destination) in May 2007 which had both Canadian and US carriers operating were examined. This is because there can be many reasons for flight delays.[4] In case the delay was due to holding the flight in Toronto due to problems of weather or congestion at the flight destination, only those destinations with both Canadian and US carriers in that market were examined as these reasons for delay should affect a carrier regardless of the nationality. There were 177 different scheduled flight numbers in these 20 markets, with 91 (51%) operated by Canadian carriers and 86 (49%) operated by US carriers.

When these 20 markets were examined, in 12 markets (60%) a US carrier flight had the lowest difference between the scheduled and actual departure time leaving 8 markets (40%), where a Canadian carrier flight had the lowest difference between the scheduled and actual departure time. Also in 12 markets (60%), a US carrier flight had the largest difference between the scheduled and departure time. As there are typically multiple flights between city-pairs in one day, it is possible for a market to have a US or a Canadian carrier operating both the most on-time flight (lowest difference) and the least on-time flight (largest difference) in that specific market.

While Table 1 had suggested better on-time performance by Canadian carriers, the situation shown in Table 2 for the markets with both Canadian and US carriers operating shows less of a difference. Canadian carriers are slightly overrepresented in the first two categories. When the difference in the scheduled versus actual time

was the largest, indicating poorer on-time performance, the US carriers did account for a larger proportion than their volume of flights would have suggested.

Table 2 Average time lag between gate departure and runway departure, by nationality, Toronto Pearson International Airport, markets with both Canadian and American Carriers, May 2007

Time lag	Canadian carrier flights %	US carrier flights %
<= 15 minutes	53	47
16-20 minutes	54	46
21-25 minutes	60	40
26-30 minutes	58	42
31-35 minutes	42	58
36-40 minutes	55	45
41-45 minutes	17	83
46-50 minutes	33	67
51-55 minutes	50	50
>= 56 minutes	20	80

Source: OAG special selection and Statistics Canada's Aircraft Movement Statistics Survey

Affiliate versus Major Carrier Differences

The flights were examined to see if there were any differences due the flights being conducted by major carriers or by a feeder or affiliate airline.

In the 20 markets with both Canadian and US carriers competing, of the 177 different scheduled flight numbers there were 83 (47%) conducted by affiliate/feeder carriers and 94 (53%) conducted by major carriers. Four of the 20 markets did not have any feeder/affiliate carriers operating.

In 12 markets (60%), an affiliate/feeder carrier flight had the lowest difference between the scheduled and actual departure time. In 6 markets (30%), an affiliate/feeder carrier flight had the largest difference between the scheduled and departure time.

Conclusion

This analysis was of departing flights only. A similar analysis could be conducted on flight arrivals. "For an airport authority the importance of arrivals and departures may be the same. For consumers, however, the time of arrival is key. If my flight departs ten minutes late but the time is made up during the flight so that the landing is on-time, I am less likely to be concerned. A severe departure delay is probably of concern mostly because delays can snowball throughout a system as down line flights are affected. This is because flights may be held to allow connecting passengers on the delayed flight to make their connections. As well a flight that arrives late is more likely to depart late to the next station." [5]

This study is based on observations from only one month, May 2007. May was chosen in an attempt to avoid weather extremes (snow, thunderstorms) in winter or summer months that could affect on-time performance. There is a risk that May is not a representative month, however, so future research using a longer time frame is advised.

The premise of the paper was if air carriers attempt to maintain or improve their on-time performance, their operational procedures to enable this could affect more markets than just those covered by the statistical reporting. As American carrier domestic on-time performance is measured and published, US carriers may have instituted operational procedures to allow them to keep close to their schedule to avoid bad on-time performance ratings and possible negative implications for bookings. If these operational procedures were in use for all flights, not just domestic ones, one might think that they would score better than Canadian carriers who have no official measurement of their on-time performance. The analysis of the

departing transborder flights at Toronto Pearson International Airport for May 2007 suggested:

- that US carriers, whose domestic (US to US) on-time performance is published, may have performed poorer in the Canada-United States transborder markets with respect to on-time performance. This would suggest that whatever procedures the American carriers had put in place to enhance on-time performance domestically did not appear to extend to their transborder flights.
- that these differences between US and Canadian carriers were less pronounced in markets where the Canadian and US carriers were in competition;
- on-time performance appeared to be better for affiliate/feeder carriers than major carriers in these competitive markets.

Note

I would like to thank Marcelle Dion and Norah Hillary of Statistics Canada for their valuable comments, corrections and criticisms while retaining all responsibility for any remaining errors.

Appendix A

The analysis in this paper used data from the Aircraft Movement Statistics and the OAG (Official Airline Guide). It was noted that it was the flight number of the operating carrier that was used for flights. Flights that were code-share flights with multiple flight numbers were counted as a single flight using the flight number of the operating carrier. To show why this was necessary, see Table 3 below which shows that 13 flights, all scheduled to depart Toronto at 8:30 a.m., were made up of 21 scheduled flights, the difference being airline codeshares where one departing flight was marketed by more than one carrier sharing the same flight departure.

Table 3 Scheduled Flight Departures, May 1, 2007, 8:30a.m., Toronto Pearson International Airport

Flight	Carrier	Flight Number	Destination
1	**AC**	**7937**	**MKE**
	UA	**8175**	**MKE**
2	AC	8030	BNA
3	**AC**	**356**	**BOS**
	UA	**8214**	**BOS**
4	AC	589	PHX
	UA	8473	PHX
5	**AC**	**7823**	**YTS**
6	AC	7890	CMH
	UA	8138	CMH
7	**AC**	**7974**	**RDU**
	UA	**8284**	**RDU**
8	AC	591	LAS
	UA	8417	LAS
9	**AC**	**7454**	**MHT**
10	AC	7922	CLT
11	**AC**	**1137**	**YVR**
	OZ	**6107**	**YVR**
12	AC	1050	IAH
	UA	8350	IAH
13	**AC**	**8952**	**YFC**

Source: Special selection, Official Airline Guide

Note: Flights 5, 11 and 13 are shown in Table 3 as they have an 8:30 a.m. scheduled departure time but they were out of scope for this study as they were not Canada-US flights.

References

[1] Statistics Canada, Aircraft Movement Statistics Survey, http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=2715&lang=en&db=IMDB&dbg=f&adm=8&dis=2

[2] Bureau of Transportation Statistics, Research and Innovative Technology Administration, U.S. Department of Transportation, Air Travel Consumer Report, http://airconsumer.ost.dot.gov/reports/index.htm

[3] Bureau of Transportation Statistics, Research and Innovative Technology Administration, U.S. Department of Transportation, http://www.bts.gov/programs/airline_information/taxi_out_times/

[4] Causes of delay that air carriers use in reporting to the U.S. Department of Transportation include the following:

- "Air Carrier Delay: The cause of the cancellation or delay was due to circumstances within the airline's control (e.g. maintenance or crew problems, etc.)
- Extreme Weather Delay: Significant meteorological conditions (actual or forecasted) that, in the judgement of the carrier, delays or prevents the operation of a flight.
- National Aviation System Delay: delays and cancellations attributable to the national aviation system refer to a broad set of conditions – non-extreme weather conditions, airport operations, heavy traffic volume, air traffic control. etc.
- Security Delay: delays caused by evacuation of terminal or concourse, re-boarding of aircraft because of security breech, inoperative screening equipment and long lines in excess of 29 minutes at screening areas.
- Late Arriving Aircraft Delay: previous flight with same aircraft arrived late which caused the present flight to depart late". Table 9, Air Travel Consumer Report

[5] Gordon G. Baldwin and C. John Ross, Aviation Punctuality Statistics--Are They Worth the Wait?, Canadian Transportation Research Forum Annual Meeting Proceedings, 1995