COME FLY WITH ME:
SEASONAL AND TEMPORAL PATTERNS IN AIR TRAVEL

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INTRODUCTION

The 1987 National Transportation Act ushered in a new framework to regulate the Canadian passenger airline industry. During the ensuing three decades, the airline industry has experienced the entry of lower cost carriers as well as a consolidation among incumbents along with the increasing prominence of computer reservation systems and emergence of a new pricing regime. Dynamic pricing is a strategy based on market demand whereby reservation systems use algorithms to assign prices according to factors such as season, day of the week, hour of the day and time before departure.

An earlier paper examined the geographic impacts stemming from the growing volume of airline passengers in Canada since 2002 (Bova, Cromwell & McKeown, 2015). It found that the growth in passengers after 2002 has been uneven by travel segment and therefore was distributed unevenly among Canadian airports by size. After reviewing trends in airline passengers, this study uses passenger and aircraft movement statistics to examine changes in activity from 2005 to 2014 by month of the year, day of the week and hour of the day at Canada's major airports.

TRENDS IN AIRLINE PASSENGERS

In the United States (U.S.), the 1978 Airline Deregulation Act allowed carriers to serve any route and charge any fare in order to compete. Initially, new entrants surged and prices fell. This experience south of the border encouraged Canadian reform as passengers turned to U.S. carriers for lower fares and Canadian carriers pushed for reduced regulation to compete on an equal basis. In 1984, a Canadian Transportation Commission statement liberalized air transport by allowing carriers to compete on routes anywhere in Canada. The new policy direction set out by Transport Canada (1985) was then followed by regulatory reforms contained in the 1987 National Transportation Act (NTA) and in the 1988 Air Canada Public Participation Act.

Anticipating reforms, Canada's incumbent carriers acquired regional and feeder airlines to expand service and new entrants also joined the fray. Additional service with competitive fares created an upsurge in airline passengers in 1987 (Figure 1).[1] While the demand for air travel is influenced by factors such as fares and level of service, it is also sensitive to current economic conditions such as the 1991-92 downturn. Bolstered by Open Skies - expanded bilateral services between Canada and the U.S. - and by favourable economic conditions, the number of airline passengers climbed in the latter half of the 1990s. The events of 9/11 only served to exacerbate an already difficult situation of declining domestic travel stemming from a worsening economy (Masse, 2004).

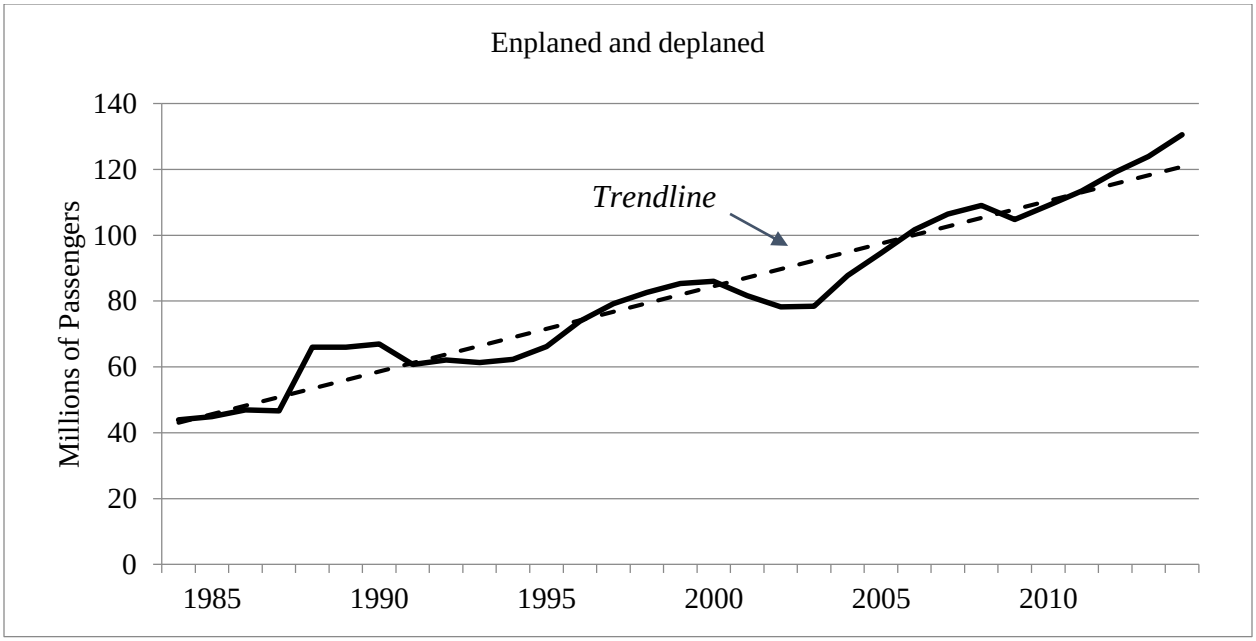

Figure 1: Total airline passengers, Canadian airports, 1984 to 2014
Source: Statistics Canada, Airport Activity Surveys

Following the 2002-03 low point, and with the exception of the 2009 economic downturn, the growth in passengers enplaned and deplaned at Canadian airports resumed its post-1987 climb.[2] However, a closer inspection of the data indicated that this upward trend was uneven, masking variations in the type of airline trips and hence the impact across Canadian airports. While all three travel segments – domestic, transborder and overseas – were growing after 2002, it was the overseas travellers that increased most significantly, rising 83% from 2002 to 2013.[3] And by 2013, Canada's largest airports, which accounted for four of every five (80%) passengers enplaned and deplaned, had captured virtually all (97%) of the fastest growing overseas segment.

TEMPORAL PATTERNS

As Bova and colleagues (2015) noted, the steady growth in airline passengers after 2002 was geographically uneven; that is, affecting some airports more than others. A related question is to what extent this higher volume of airline passengers was also uneven with respect to time: Months of the year, days of the week and hours of the day? This section examines the movement of both passengers and aircraft departing from Canada's top eight airports.[4]

In 2005, an average of over 3.2 million passengers departed from Canada's top airports each month (Figure 2). The amplitude – or difference between peak (August) and trough (November) – was roughly 1 million departing passengers in 2005.[5] By 2014, the monthly average increased by about one-third (32.9%) to almost 4.3 million passengers, departing from these same airports. The largest growth occurred in August which served to increase the amplitude to just over 1.5 million passengers, up 52% from 2005. So, with the exception of April, the growth in airline passengers from 2005 to 2014 appears to have exacerbated the already busy months of July-August and December in particular.

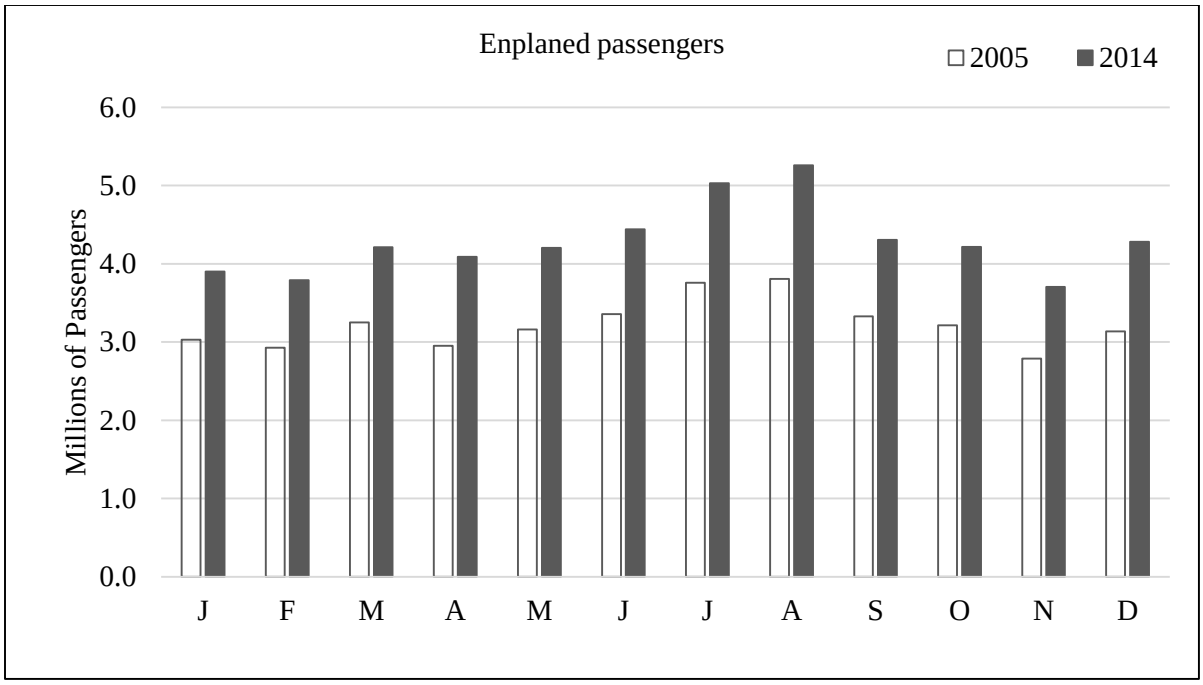

Figure 2: Total passengers by month, top 8 airports, Canada 2005 & 2014
Source: Statistics Canada, Airport Activity Surveys

In terms of aircraft movements at Canada's top airports, the total growth in departures from 2005 to 2014 was 6.4%, with April, July and December having the largest increases. As the overall growth in departures is below that of passengers enplaned, this suggests that the increase in passenger volumes was accommodated by a combination of higher load factors and the use of larger aircraft. Indeed, the average load factor for Class I scheduled service during 2005 was 78.9%, peaking at 84.4% in August. By 2014, the average load factor for Class I scheduled services had increased to 83.5%, peaking at 89.3% during the month of August.[6]

The seasonal pattern of aircraft departures, as expected, mimics that of passengers with a peak in August at over 9% of annual departures (Figure 3). This peak appears to be driven by domestic travel which represents about 68% of all destinations in the July and August summer holiday period. The fewest number of aircraft depart these airports in February and November. Transborder departures peak in March, bolstered by school breaks, while international destinations peak at more than 10% of departing aircraft during the colder months of January and into March. So, the months of February and November appear to be the two quietist in which to depart from Canada's top airports while July, August and parts of December are the busiest months.

To avoid airport congestion, what are the best days of the week to fly? In 2014, there were an average of just over 140,000 enplaned passengers departing from Canada's top airports each day of the week. This ranged from a high of almost 150,000 on Fridays to a low of 136,000 passengers on Saturday (Figure 4). Again, the total number of passengers departing from Canada's top eight airports increased by about one-third (32.9%) from 2005 to 2014. The largest growth was observed on Tuesdays (37.8%), allowing Saturday to become the least busy departure day at these airports. The daily amplitude was about 30% or 18,400 passengers in 2014.

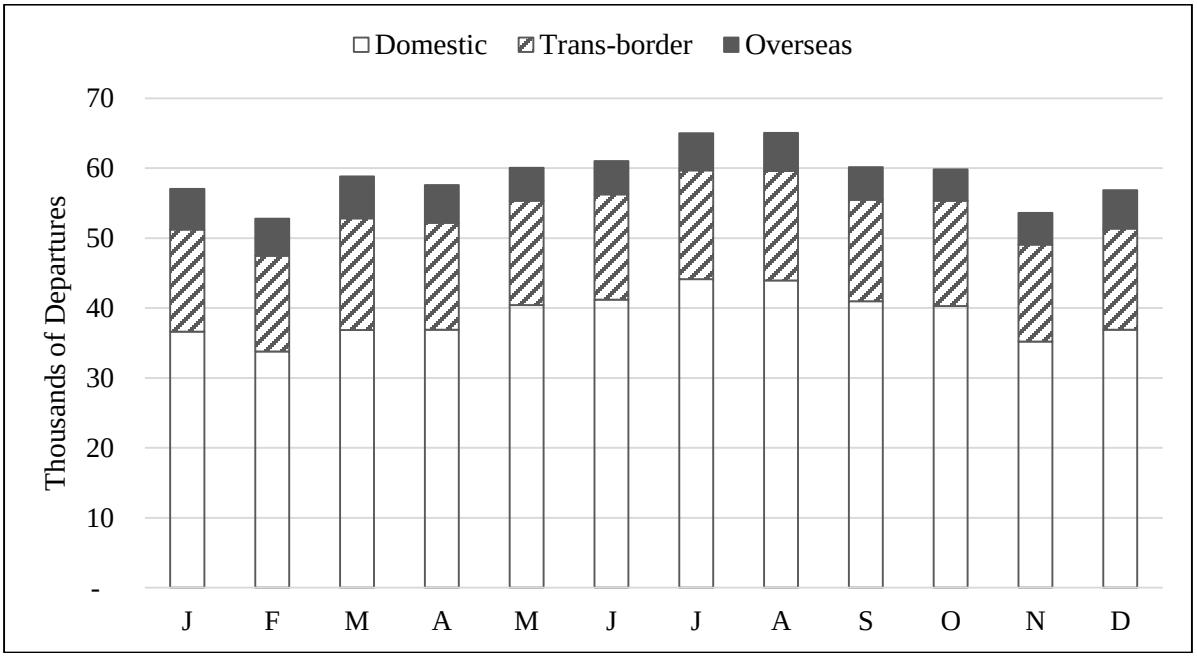

Figure 3: Total aircraft departures by month, top 8 Canadian Airports, 2014
Source: Statistics Canada, Aircraft Movement Statistics[7]

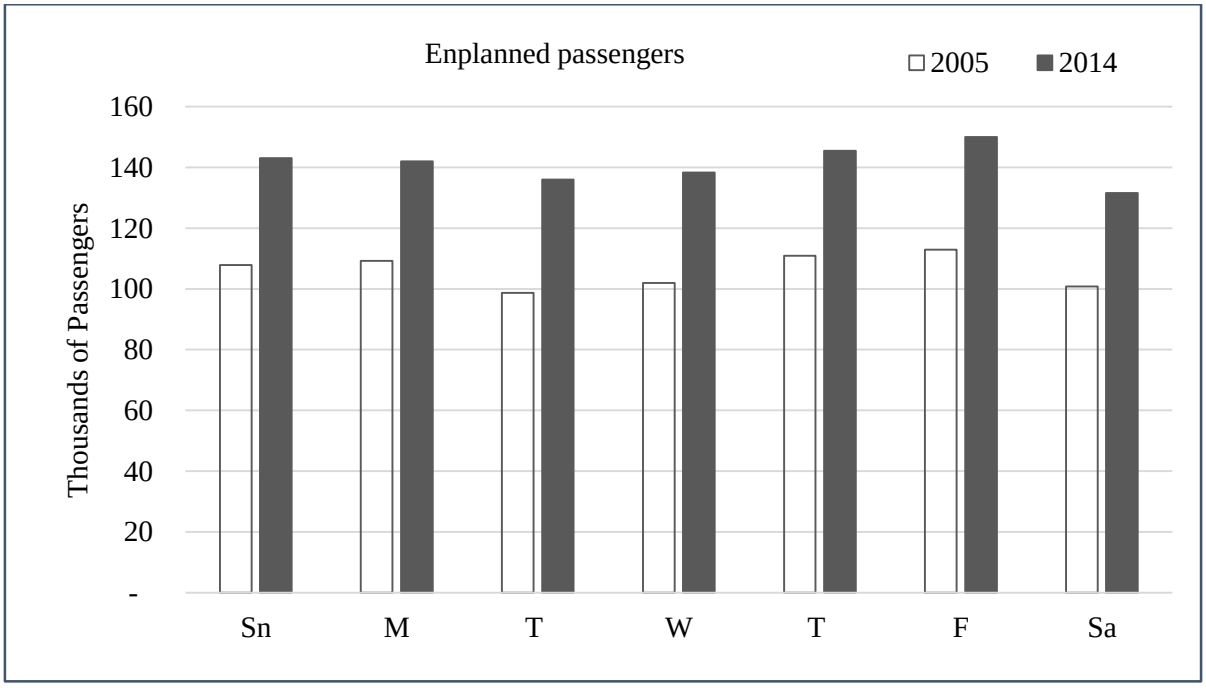

Figure 4: Average passengers by day, top 8 airports, Canada 2005 & 2014
Source: Statistics Canada, Airport Activity Surveys

In 2014, there was an average of 1,939 flights departing from Canada's top airports, up 6.4% from 1,823 in 2005. The largest growth was on Sundays, which experienced an increase of over 9%. The number of aircraft departing on Fridays increased just above the average rate, implying that aircraft were accommodating the growth in passengers departing with higher load factors (averaging 83.9% in 2014 compared to 78.9% in 2005). The lowest growth in passenger airline departures was on Wednesday and Thursday, with an average increase in flights of 3.7% and 4.0% respectively from 2005 to 2014 at these same airports.

Weekly patterns in 2014 are clearer when examined according to aircraft departures by travel segment (Figure 5). While there is little variation in domestic departures throughout the week, on average there were about 500 fewer flights with domestic destinations on Saturdays and Sundays combined. Conversely on the weekends, there was a daily average of roughly 40 more international flights departing from Canada's top eight airports compared to an average weekday. Having more international flights on weekends helps to even out airport utilization over the week. Transborder departures were a little higher than average at the start (Monday) and the end (Thursday and Friday) of the week but fell by an average of 70 departures on Saturdays.

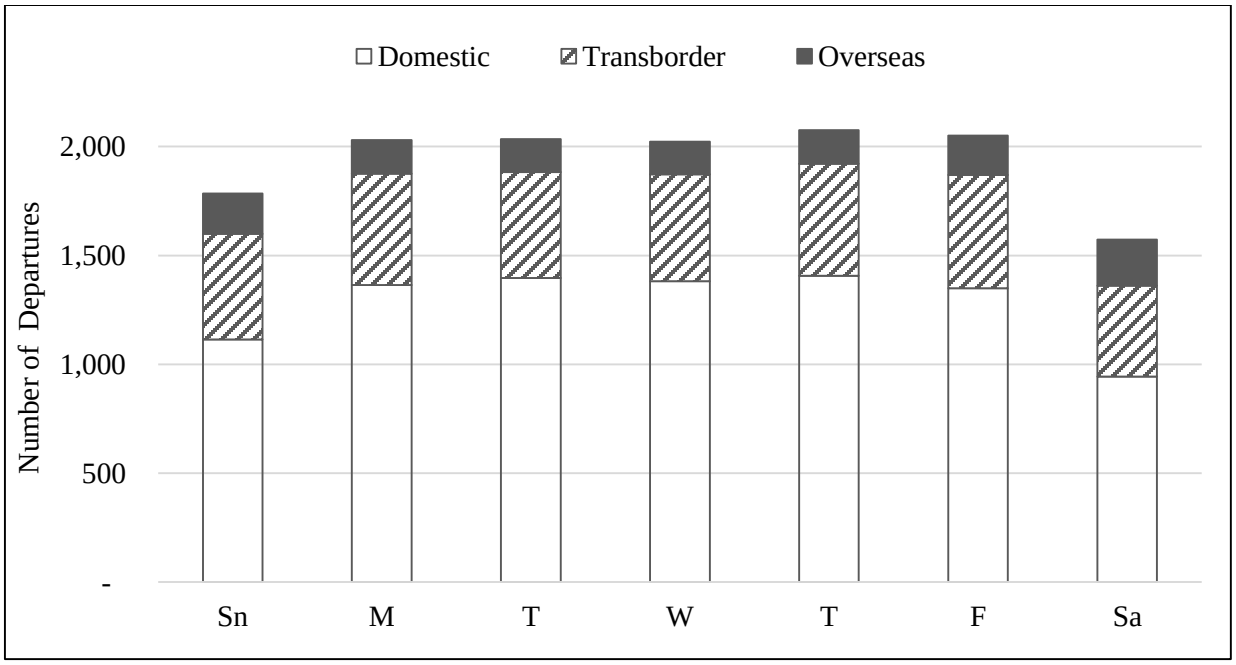

Figure 5: Average aircraft departures by day, top 8 airports, Canada 2014
Source: Statistics Canada, Aircraft Movement Statistics

It is well known in travel circles that planes have the largest number of empty seats on Tuesday and Saturday. However, the real culprit with respect to peaking is departure times during the day, coinciding with travel to work morning and late afternoon peaks (Figure 6). In 2014 during weekdays, 63% of the flights departing from Canada's top eight airports did so during the eight hours that constitute the morning (6:00 to 10:00 am) and afternoon (4:00 to 8:00 pm) peak periods, with the former being somewhat sharper. The pattern by time of day was similar in 2005, except with the morning apex being a little earlier and the evening peak not extending as late

As mentioned previously, with flights in 2014 having a higher load factor on average than was the case in 2005, all else being equal there would be a higher number of passengers aboard each flight. Therefore, these morning and afternoon peaks would entail a greater volume of passengers passing through these airports during these times. On the weekends, it remained much flatter with about two-thirds (68%) of departures spread more or less evenly over the ten hours from 8:00 a.m. until 6:00 p.m. in both 2005 and 2014. With more international destinations on the weekends, there is likely some flexibility in terms of both times of departure and arrival.

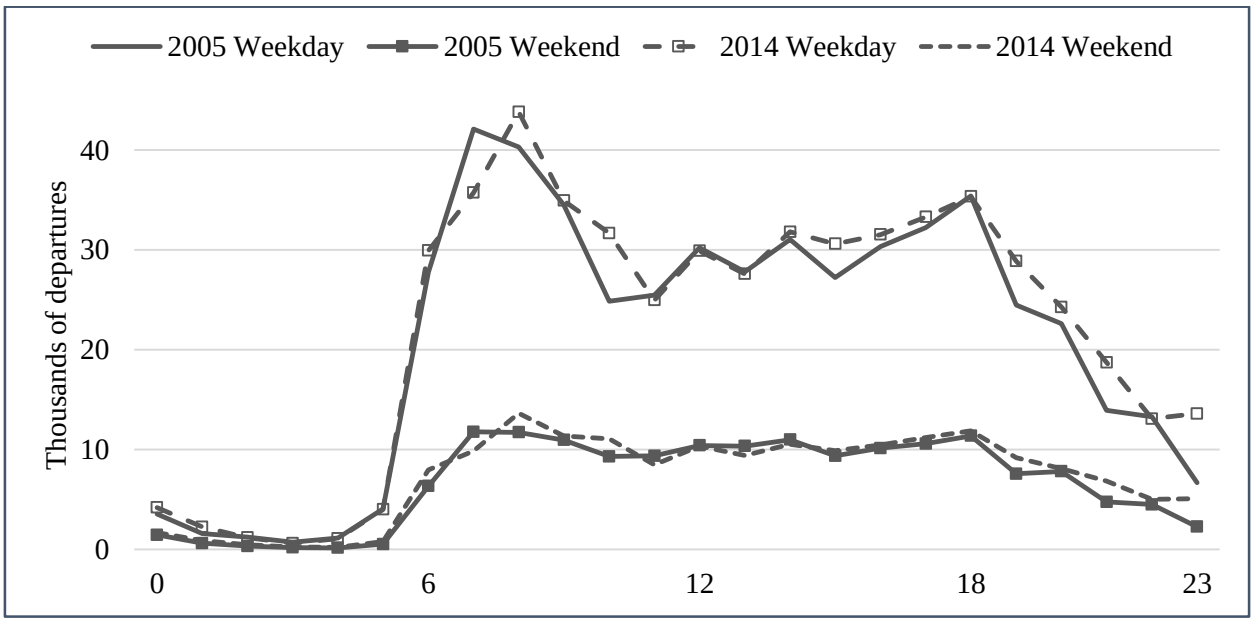

Figure 6: Annual aircraft departures by hour of day, top 8 airports, Canada 2005 & 2014
Source: Statistics Canada, Aircraft Movement Statistics

However, there is less flexibility to spread out the daily peak periods during the week. While international airports in Canada are open technically 24-hours a day, each has a noise abatement protocol with different access restrictions depending on local conditions (e.g. wind speed and direction, proximity of residential neighbourhoods). Protocols often involve restrictions from 12:00 a.m. to 6:00 a.m. on larger and older jet aircraft, on the use of excessive reverse thrust during landing and on the use of certain runways with flight paths over residential neighbourhoods.[8] Typically most of the night-time traffic tends to be cargo and courier services.

SUMMARY

Certain months of the year, days of week and hours of day combine to create sharp peaks at Canada's top airports. In 2014, the most crowded single day to fly was on Friday, August 15th when more than 183,600 passengers departed Canada's top eight airports, a 30% spike from the annual daily average. During the 2014 Christmas season, Friday December 19th was the busiest day with 171,400 passengers departing from the top airports. On an average Friday, about 1 of 5 passengers (19.3%) departed between 4:00 and 7:00 p.m. Conversely, the least crowed time to depart from these top airports was between 11:00 a.m. and 1:00 p.m., on a Tuesday, Wednesday or Saturday, during November into early December and then again during late January and into February.

Since the 1987 reforms of the passenger airline industry, carriers are competing on fares, striving to operate efficiently by achieving higher load factors. At the same time, they must also try to shift passenger and aircraft traffic from peak into off-peak periods. Dynamic pricing represents a strategy to encourage this shift by essentially considering the price elasticity of demand in setting fares.[9] This can be frustrating at an individual level, since passengers can end up paying different prices for essentially the same service. From a social welfare perspective however, it represents an efficient market solution. And a principle underlying the 1987 regulatory reforms is that market forces are the best means for providing Canadians with efficient transportation at the lowest cost.

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ENDNOTES

[1] The increase was probably not so pronounced since Canadian Airlines and Air Canada were already relying on regional partners (excluded from the Airport Activity Survey counts until 1988) by 1986 as they moved to a hub and spoke operation (Bova, Cromwell & McKeown, 2015).

[2] Enplaned passengers count those who embark and take off from a Canadian airport while deplaned passengers count those who land and disembark at a Canadian airport.

[3] Transborder is traffic between an airport in the United States (including Alaska, Hawaii and Puerto Rico) and an airport in Canada while overseas traffic is between an airport in a foreign country (excluding the U.S.) and an airport in Canada.

[4] The top eight airports consist of: Pearson in Toronto, Vancouver, Trudeau in Montréal, Calgary, Edmonton, MacDonald-Cartier in Ottawa, Stanfield in Halifax and Richardson in Winnipeg.

[5] In the U.S., the peak month for air travel is also August but the Thanksgiving Day effect in November makes February the least busy month to fly.

[6] Statistics Canada, CANSIM Table 401-0043.

[7] Aircraft departures include Itinerant movements of Level I to III carriers as well as foreign carriers but exclude several exclusive cargo carriers.

[8] Often, community groups such as, for example, the Toronto Aviation Noise Group (TANG) are active in helping to monitor compliance with airport-related noise levels in their respective areas (Moore, 2016).

[9] While not precisely Ramsey pricing – when the mark-up is inversely related to the price elasticity of demand - dynamic pricing reflects the underlying demand. In theory, the response to a fare increase by a consumer with a lower price elasticity of demand for a flight is to consume less (i.e. income effect) or find an alternative (i.e. substitution effect). In both cases, this may result in the passenger shifting travel to a different mode or carrier as well as to a different time (month, day or hour) with the same carrier.