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Assignment 2: Answer

Southwest Airlines boarding and game theory

Southwest Airlines is unique in its boarding process. Rather than providing assigned seats, Southwest has a policy of “open-seating.” This means during the boarding process that travelers are free to sit in any seats that are available.

As an aside, people have a love/hate relationship with open-seating. The bad part is that groups and families cannot reserve seats and might get split up. The good part is that open-seating is much faster than assigned seating. Shorter times at the gate save Southwest money, and that indirectly keeps airfares low.

The cost savings are a major reason Southwest has employed open-seating for its entire 42-year history. In the last 6 years, however, there have been a couple of notable changes.

One change, in particular, translated into revenue of \$98 million in 2010 and \$144 million in 2011. And, as I’ll explain below, the revenue is a consequence of pitting customers into a Prisoner’s Dilemma style game.

A few recent changes to open-seating

While Southwest does not assign individual seats, it does have an organized procedure for how passengers board the aircraft.

Prior to 2007, passengers generally boarded on a first-come, first-serve basis. That is, travelers who arrived at the gate earliest could board first and pick the most favorable seats. This led to passengers “camping out” at the gate to secure a good boarding position and it was accompanied by minor arguments as people tried to save seats or cut in line.

In 2007 Southwest decided to end this “cattle call” process. The new process assigned each traveler a boarding group A, B, or C and boarding number. Travelers in group A went first, then B, and then C. Within each group, a traveler with a lower boarding number got on the airplane first. Travelers could still choose seats once on board the airplane, but there was much more order at the gate because people lined up in an orderly fashion.

How were travelers assigned a boarding number? The number was based on time at which the traveler checked in for the flight. Someone who checked in at the earliest time, 24 hours in advance of the flight, could secure a favorable boarding assignment. A traveler who forgot to check in online was often doomed and would have to wait at the end of the line.

The boarding assignment changed the game in a very interesting way. Instead of rewarding passengers who waited at the gate the longest (people who did not value their time), the boarding assignment generally rewarded people who could check in online in advance (people who were organized and often affluent).

A secondary market sprung up to capitalize on the technology of online-boarding, with some websites offering to automatically check a traveler in at the earliest time 24 hours before a flight. The service was reliable and cost \$1, a very appealing offer for the busy business traveler.

These third-party websites were tolerated until Southwest shut them down and decided that it should be the one profiting. In 2009, Southwest unveiled the most recent change to open-boarding called EarlyBird Check-in. It was this option that led to millions of dollars in extra fees.

The EarlyBird Prisoner’s Dilemma

Southwest explained the EarlyBird Check-in in the following press release:

Don’t race. We’ll save your place! Southwest is proud to announce its newest product, EarlyBird Check-in, which gives Customers the option to score an early boarding position by adding an additional \$10 to the

price of a one-way fare. The low-cost service automatically reserves a boarding position for Customers prior to general check-in...

Instead of playing the seating lottery, customers who were willing to pay could secure priority seating by paying \$10 per one-way flight. The nuance is the EarlyBird Check-in does not guarantee a good seat. It only means the airline checks that traveler in automatically.

In many travel columns, people wondered if the service provided a good value: Southwest's EarlyBird Check-in: Worth the \$10?

But on a larger level, those discussions missed the true nature of the situation. The genius is the EarlyBird Check-in threw travelers into a Prisoner's Dilemma from which Southwest could mightily profit!

Here is the game. An individual traveler wonders if he should pay \$10 to be automatically checked-in for his flight. In his mind, the game is:

- Pay \$10 for good seat
- Pay \$0 for a lottery style seating

But the game is more complicated than that. In fact, the traveler is competing with others who are making exactly the same decision!

Consider the game between two travelers who compete for the best seat. The possible outcomes are:

- if neither pays for EarlyBird, then both can expect okay seats in the seating lottery
- if only one pays \$10 for EarlyBird, that person gets a good seat
- if both pay \$10 for EarlyBird, then they both get put into a lottery for priority seats. This essentially means they are competing in a seating lottery, but they both have to pay \$10 to do it

Or in table form:

		Traveler B	
		EarlyBird Check-in	Not
Traveler A	EarlyBird Check-in	A okay seat B okay seat	A good seat B bad seat
	Not	A bad seat B good seat	A okay seat B okay seat

And therein lies the Prisoner's Dilemma. Paying the \$10 for EarlyBird Check-in is a dominant strategy!

(If the other person does not do it, then someone who cares about a good seat will pay \$10 for EarlyBird Check-in. If the other person does it, then the other traveler is surely better off buying EarlyBird Check-in as opposed to ending up with a bad seat for sure.)

In the end, both might be better served saving \$10 and playing the seating lottery. But since they compete, they end up spending \$10 for the privilege of playing a seating lottery.

The bottom line: significant profits for Southwest since the marginal cost is zero

Now there are some travelers who never will pay \$10. But practically, a good portion are willing to pay for the privilege and are caught in this Prisoner's Dilemma.

Southwest has profited tremendously from EarlyBird Check-in. In 2010, Southwest reported an extra \$98 million in revenue from EarlyBird Check-in, exceeding expectations. In 2011, Southwest revenue from EarlyBird Check-in grew 44 percent. The service translated to an extra \$142 million in revenue.

Originally, few people paid for EarlyBird Check-in and that meant a guaranteed good seat. Now, so many people do pay that even Southwest admits paying for EarlyBird may not guarantee boarding within the first 60 positions:

While EarlyBird Check-In doesn't guarantee an A boarding position [that is, the first 60 positions], it improves your seat selection options to help you get your favorite seat.

The brilliant part is that travelers are essentially stuck in this game. Individual travelers cannot stop playing this game as it will result in bad seating. Furthermore, as more people pay for priority boarding, this sends the remaining travelers into worse and worse boarding positions. So the game essentially attracts more people to opt for EarlyBird Check-in.

Of course, there is a limiting factor to this game. If too many people opt for EarlyBird Check-in, then Southwest cannot guarantee all these travelers good seats. Some people will end up in bad boarding positions and will feel pissed off they paid for it, eroding the value of EarlyBird Check-in.

Still, this is unlikely to be a problem any time soon. Southwest is the airline of choice for cost-conscious travelers, so ultimately many travelers will never pay for this service and EarlyBird will still offer priority seating.

That means EarlyBird Check-in should be profitable for years to come. Well done, Southwest.