Merck Challenge: Creating Smarter Travel Policies

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In order to analyze the data, our group utilized Microsoft Excel and its available functions to condense and filter the data in 6 steps and a 2-step regression analyses.

6 Steps to making big data, small data: First, we identified that each trip entry had a unique PNR code which was duplicated when additional charges and surcharges were provided. Second, we used the SUMIF function to add all costs and have each PNR code represent the entire cost of the trip. Third, we filtered out all duplicate PNR codes, which left just one entry per trip on each of the flight and trip data workbooks. Fourth, we combined the corresponding flight and trip data into one Excel workbook using separate spreadsheets and utilized the LOOKUP function to merge data of matching PNR codes. Fifth, we sub-set the data and deleted excess information that we did not find relevant to include in our regression analysis. Sixth, we performed regression analyses.

2-Step Regression Analyses: First, the total trip cost was regressed on the advance purchase group and a binary variable indicating compliance to the policy on accepting the lowest fare. Second, a probit regression was done to examine the effect of advance purchase group on the probability of trip declines or conflicts. In both regressions, number of trip segments, service class, fare basis, and trip purpose were used as control variables. We treated all regression coefficients statistically insignificant at $p<0.05$ as zeros. Outside US, most coefficients were statistically insignificant and were graphed as zeros on the graph.

Findings: From the regression, we also conclude that the current policy of accepting the lowest fare, combined with the 14-day advance purchase policy, does not always guarantee the lowest trip cost because there may have been a lower price available at a different booking date. Even when booking the lowest fare, there is a chance of heightened conflict which will cause interference with travel, productivity, and cause employee frustration.

For Inside US, we discovered that the ability to book trips less than four days from departure will provide substantial savings year-round. Additionally, from February to May, booking less than four days from departure results in the lowest probability of trip conflict. January, although not having the lowest conflict probability for the month, is consistent with the baseline of fourteen to twenty days as well as maintaining the significant cost reduction of booking early. For June and following months, there is no cost reduction from the baseline, but the probability remains lower than any other booking timeframe. Booking twenty days or earlier achieves an even lower chance of conflict in December.

Outside US data presents a much less consistent pattern. Although there appears to be no readily generalizable trend, higher trip costs are observed in October when booked thirteen days or earlier. The change in probability of conflict, however, shows valuable information. The analysis shows that booking fourteen or more days in advance almost always guarantees the lowest possibility of conflict to occur. However, specifically in the months of January to March, the lowest probability of conflict pertain to bookings less than four days in advance, while maintaining the same costs.

We have found that the current policy negatively affects employee work and personal lives as there is a chance of conflict, which lowers productivity and increases employee frustration during booking and travel.

Suggestion: Through our research we have generated a few policy suggestions:

For Inside US travel, trips are best booked less than four days before departure during January to May. From June to December, the current policy of at least fourteen days advance booking yields the lowest probability of conflict.

For Outside US travel, trips are best booked less than four days before departure during January to March. From April to December, trips are best booked between fourteen and twenty days in advance as to minimize both costs and probability of conflict.