

Developing Purpose-Built Applications with SAS®

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Purpose-Built Solutions with SAS

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Caesars Entertainment is using SAS[®] Viya[®] for charter flight scheduling analytics to increase profitability and save the charter team substantial planning time. Working alongside SAS, Caesars developed a bespoke solution to better schedule aircrafts in the right markets, at the right time, and with the right frequency to increase program profitability.

Purpose-Built Solutions with SAS

Caesars Charter Flight Scheduling Analytics

Scope

SAS worked with Caesars to understand the business problem, build trust, and answer preliminary questions

Develop

After building confidence, Caesars started using the developing SAS assets to confirm value

Deploy

Deployed purpose-built, end-to-end solution for Caesars
Plans to expand the solution with additional data sources & revenue management refinement

Prioritize High Performing Flights for Monthly Schedules

SAS® Visual Analytics - Explore and Visualize

What if we have a specific flight to fill?

Schedule Planning Ranking : Origin Drill-Down: Can we fly again?

Select Schedule Month of Interest: Jan2024

Filter by Schedule Date - optional: Schedule Date

Filter by Origin: Origin

Filter by Region Code: Region Code

Filter by Direct/Multi-Stop Flight: Multi Stop Flag

Filter by Weekday, Weekend: Weekday(end) Group

Filter by Plane Type: Plane Type

Show Only Completed Market % Flights > X%: Enter > X% Flight Freq Param

Drill-Down: Best Market Option

Date Month/Year	Market	Predicted MP of Future Flight (m...)
Jan2024	Long Island, NY-West 1	\$523
Jan2024	Long Island, NY-West 3	\$430
Jan2024	Grand Rapids, MI-South East 1	\$304
Jan2024	Buffalo, NY-West 1	\$276
Jan2024	Scranton, PA-South East 2	\$259
Jan2024	Pensacola, FL-West 1	\$242
Jan2024	Green Bay, WI-West 3	\$234
Jan2024	Richmond, VA-South East 2	\$216
Jan2024	Philadelphia, PA-South East 1	\$200
Jan2024	Peoria, IL-South East 1	\$177
Jan2024	Long Island, NY-West 1	\$175
Jan2024	Columbus, OH-South East 1	\$174
Jan2024	Memphis, TN-South East 1	\$173
Jan2024	Long Island, NY-West 1	\$170
Jan2024	Augusta, GA-South East 1	\$169
Jan2024	Bristol, TN-South East 1	\$166
Jan2024	Ft. Wayne, IN-South East 2	\$165
Jan2024	Cleveland, OH-South East 1	\$165
Jan2024	Grand Rapids, MI-South East 2	\$165
Jan2024	Washington, DC-South East 2	\$165
Jan2024	Cleveland, OH-West 1	\$165
Jan2024	Rochester, NY-South East 1	\$165
Jan2024	Chattanooga, TN-West 2	\$165
Jan2024	Washington, DC-North East 1	\$165
Jan2024	Greenville, SC-North East 1	\$165
Jan2024	Knoxville, TN-South East 1	\$165

Interactive Detailed Data: All available flight options within filters applied

Best Rank (Top Market Picks)	Rank Score	Predicted MP of Future Flight	Market	Date From	Date To	Plane Type	Multi Stop Indicator	Market Freq Bucket	Origin Closest Flight Freq Bucket
1	20	\$523	Long Island, NY-West 1	01 Jan 2024	31 Jan 2024	Large Planes	0	70+	32+
2	20	\$523	Long Island, NY-West 3	01 Jan 2024	31 Jan 2024	Large Planes	1	70+	32+
1	20	\$430	Long Island, NY-West 1	01 Jan 2024	31 Jan 2024	Large Planes	0	70+	32+
2	20	\$430	Long Island, NY-West 3	01 Jan 2024	31 Jan 2024	Large Planes	1	70+	32+
3	20	\$422	Long Island, NY-West 1	01 Jan 2024	31 Jan 2024	Large Planes	0	70+	32+
4	20	\$422	Long Island, NY-West 3	01 Jan 2024	31 Jan 2024	Large Planes	1	70+	32+
3	20	\$343	Long Island, NY-West 3	01 Jan 2024	31 Jan 2024	Large Planes	0	70+	32+
4	20	\$343	Long Island, NY-West 1	01 Jan 2024	31 Jan 2024	Large Planes	1	70+	32+
5	20	\$324	Long Island, NY-West 1	01 Jan 2024	31 Jan 2024	Large Planes	0	70+	32+
6	20	\$324	Long Island, NY-West 3	01 Jan 2024	31 Jan 2024	Large Planes	1	70+	32+

What if we wait?

What are the best markets to fly for the schedule month?

Origin Selected (Fly again score)
Long Island, NY (0.5)

Origin Flights by Month

Month	# Origin Flights within a Month
February	15
March	15
April	10
May	10
June	10
July	10
August	10
September	15
October	15
November	10
December	10

Origin Flights by Destination

Region Code	# Origin Flights within a Month
West 1	15
South East 2	10
South East 1	10
West 2	10
West 3	10

Market Performance by Month

Month	Market Performance
February	\$800
March	\$451
April	\$608
May	\$435
June	\$16
July	\$369
August	\$579
September	\$802
October	\$216
November	\$363
December	\$511

Detail Data - Past Flight Performance

Market	Arrive Date	# Origin Flights within a Month	Log - # Origin Flights within Last Month	Market Performance	Flight Theo Profit (adj)	# Flights	Plane Type
Long Island, NY-West 1	21Feb2016	1	1	Average: \$515	Average: \$100,207	Count: 42	1 Large Planes
Long Island, NY-South East 2	20Mar2016	1	1				1 Small Planes
Long Island, NY-South East 2	12Apr2016	2	2				1 Small Planes
Long Island, NY-West 3	28Apr2016	2	2				1 Large Planes
Long Island, NY-West 1	03Sep2016	1	1				1 Large Planes
Long Island, NY-South East 2	03Oct2016	1	1				1 Large Planes
Long Island, NY-West 1	01Dec2016	1	1				1 Large Planes
Long Island, NY-West 1	22Feb2017	1	1				1 Large Planes
Long Island, NY-South East 2	12Mar2017	1	1				1 Large Planes

What if we fly again?

Analysis Methodology

How good is a flight?

1. Calculate Revenue per Seat
2. Calculate Market Performance
 - Standardize Revenue per Seat on all non-origin related factors

From where should we fly?

3. Predict Market Performance for future flights

How Good is a Flight?

$$\text{Total Market Revenue (adj for outliers) / Total Seats} \\ = \text{Revenue per Seat}$$

Flight Example:

- Market: Mid-west origin – west region destination
- Total Market Revenue
 - \$100,000
- Total Seats
 - 125
- Revenue per Seat
 - \$800



$$\text{\$100,000} / 125 = \text{\$800 Revenue per Seat}$$



How Good is a Flight?



Standardize Revenue per Seat on all non-origin related factors




- Region Code
- Plane Type
- Multi Stop
- Timing
 - Year
 - Month
 - Week
 - Weekend / Weekday
 - New Year's Eve
 - Covid

Examples of differing expectations by various groups compared to grand average of all flights

Month	Revenue per Seat (avg)
April	11% 
November	5.5% 

Weekend vs Weekday	Revenue per Seat (avg)
Weekend	10% 
Weekday	11% 

Plane Type	Revenue per Seat (avg)
Small Plane	29% 
Large Plane	9% 

Region Destination	Revenue per Seat (avg)
West	6% 
South	15% 
Southwest	38% 

How Good is a Flight?

Flight Example:

- Market: Mid-west origin – west region destination
- Recorded Revenue per Seat
 - \$800
- Standardized (Expected) Revenue per Seat
 - \$700
 - Expected Revenue per Seat is based on the following attributes:
 - Large plane, in January 2022, direct, weekday flight to west region destination

How Good is a Flight?

Define & calculate **market performance** (MP)

$$\text{Revenue per Seat (adj for outliers)} - \text{Standardized (Expected) Revenue per Seat} \\ = \text{Market Performance}$$

Market Performance is the difference of an origin's recorded revenue per seat from what is expected for that specific flight

Flight Example:

- Market: Mid-west origin – west region destination
- Revenue per Seat
 - \$800
- Standardized (Expected) Revenue per Seat – historical, average flight expectation regardless of origin
 - Large plane, in January 2022, direct, weekday flight to west region destination
 - \$700

$$\text{\$800} - \text{\$700} = \text{\$100 Market Performance}$$

How Good is a Flight?

Define & calculate **market performance** (MP)

$$\text{Revenue per Seat (adj for outliers)} - \text{Standardized (Expected) Revenue per Seat} \\ = \text{Market Performance}$$

Market Performance is the difference of an origin's recorded revenue per seat from what is expected for that specific flight

Flight Example:

- Market: Northeast origin – west region destination
- Revenue per Seat
 - \$900
- Standardized (Expected) Revenue per Seat – historical, average flight expectation regardless of origin
 - Small plane, in April 2022, direct, weekend flight to west region destination
 - \$975

$$\mathbf{\$900 - \$975 = (\$75) \text{ Market Performance}}$$

From Where Should We Fly?

Predict Market Performance (MP)
for all potential future flights

- Included in the MP model, origin-specific factors:
 - MP trends by flight attribute
 - Origin-specific interactions
 - Geography
 - Geo-seasonal interactions
 - Frequency
 - Recency



From Where Should We Fly?

SAS® Visual Analytics - Explore and Visualize

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Buffalo, NY-West 1	\$276
Scranton, PA-South East 2	\$259
Pensacola, FL-West 1	\$242
Green Bay, WI-West 3	\$234
Richmond, VA-South East 2	\$216
Philadelph	
Peoria, IL-S	
Long Island	
Columbus,	
Memphis,	
Long Island	
Augusta, G	
Bristol, TN	
Ft. Wayne, IN-South East 2	\$177
Cleveland, OH-South East 1	\$175
Grand Rapids, MI-South East 2	\$174
Washington, DC-South East 2	\$173
Cleveland, OH-West 1	\$170
Rochester, NY-South East 1	\$169
Chattanooga, TN-West 2	\$166
Washington, DC-North East 1	\$165
Greenville, SC-North East 1	\$165
Knoxville, TN-South East 1	\$163

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1	20	\$430	Long Island, NY-West 1	01 Jan 2024	31 Jan 2024	Large Planes	0	70+	32+
2	20	\$430	Long Island, NY-West 3	01 Jan 2024	31 Jan 2024	Large Planes	1	70+	32+
3	20	\$422	Long Island, NY-West 1	01 Jan 2024	31 Jan 2024	Large Planes	0	70+	32+
4	20	\$422	Long Island, NY-West 3	01 Jan 2024	31 Jan 2024	Large Planes	1	70+	32+
3	20	\$343	Long Island, NY-West 3	01 Jan 2024	31 Jan 2024	Large Planes	0	70+	32+
4	20	\$343	Long Island, NY-West 1	01 Jan 2024	31 Jan 2024	Large Planes	1	70+	32+
5	20	\$324	Long Island, NY-West 1	01 Jan 2024	31 Jan 2024	Large Planes	0	70+	32+
6	20	\$324	Long Island, NY-West 3	01 Jan 2024	31 Jan 2024	Large Planes	1	70+	32+
1	20	\$304	Grand Rapids, MI-South East 1	01 Jan 2024	31 Jan 2024	Large Planes	0	70+	32+
2	20	\$304	Grand Rapids, MI-South East 2	01 Jan 2024	31 Jan 2024	Large Planes	1	70+	32+
3	20	\$292	Grand Rapids, MI-South East 1	01 Jan 2024	31 Jan 2024	Large Planes	0	70+	32+
4	20	\$292	Grand Rapids, MI-South East 2	01 Jan 2024	31 Jan 2024	Large Planes	1	70+	32+
1	20	\$276	Buffalo, NY-West 1	01 Jan 2024	31 Jan 2024	Large Planes	0	70+	32+
2	20	\$276	Buffalo, NY-West 1	01 Jan 2024	31 Jan 2024	Large Planes	1	70+	32+
3	20	\$276	Buffalo, NY-West 1	01 Jan 2024	31 Jan 2024	Large Planes	0	70+	32+
4	20	\$276	Buffalo, NY-West 1	01 Jan 2024	31 Jan 2024	Large Planes	1	70+	32+
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1	20	\$259	Scranton, PA-South East 2	01 Jan 2024	31 Jan 2024	Large Planes	0	70+	32+
2	20	\$259	Scranton, PA-South East 2	01 Jan 2024	31 Jan 2024	Large Planes	1	70+	32+
1	20	\$242	Pensacola, FL-West 1	01 Jan 2024	31 Jan 2024	Large Planes	0	70+	32+
2	20	\$242	Pensacola, FL-West 1	01 Jan 2024	31 Jan 2024	Large Planes	1	70+	32+
3	20	\$241	Pensacola, FL-West 1	01 Jan 2024	31 Jan 2024	Large Planes	0	70+	32+
4	20	\$241	Pensacola, FL-West 1	01 Jan 2024	31 Jan 2024	Large Planes	1	70+	32+
3	20	\$241	Scranton, PA-South East 2	01 Jan 2024	31 Jan 2024	Large Planes	0	70+	32+

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Origin Flights by Month

Origin Flights by Destination

Market Performance by Month

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Long Island, NY-West 1	01Dec2016	1					1 Large Planes
Long Island, NY-West 1	22Feb2017	1					1 Large Planes
Long Island, NY-South East 2	12Mar2017	1					1 Large Planes

What if we fly again?

Caesars Success

SAS provides us with...

- **Trusted results**

We believe in the results. The data is more holistic as well; people don't have to remember to account for one-off or unique scenarios, the logic is consistent, automated, and presented in one usable view. We don't lose anything when there is turnover, it is only a matter of learning how to interpret the results.

- **Better decisions**

When we compare program results to before the SAS solution – there were decisions we would have made differently. We could identify markets we would not have selected had we used SAS to show better options.

- **Efficiency**

Instead of my scheduler and analysts spending days each month gathering past data into a spreadsheet (with multiple tabs) and adding their own calculations, they can access one inclusive view with automated data updates for the schedule month.

- **Ease of use**

I don't have to worry about my schedulers' analytic ability, I just have to present how to read and use the data.

“Accomplishing one version of the truth is helpful and ultimately more profitable for us.”

Jeremy Diederich, Vice President Travel Management



Thank you!

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SAS **EXPLORE**

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