An Exploratory Study in Forecasting Rounds of Golf

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ABSTRACT

A two-phase process was used to forecast demand fluctuation in monthly tourist rounds of golf (TROG) in Myrtle Beach, SC, a major United States tourism area. Myrtle Beach, SC is known as "The Golf Capital of America." In 2000, Myrtle Beach had over 125 golf clubs. Nine years later, that number has decreased to less than 100 due, in part to a decrease in active vacation golfers. Recent volatility in gasoline prices have added additional negative pressure to the actual TROG being played. This study uses two complementary methods to forecast TROG. Holt-Winters smoothing is adjusted with a variant of Saaty's Analytical Hierarchy Process to provide additional accuracy as compared to traditional quantitative methods.

INTRODUCTION

The National Golf Foundation reports almost 15% fewer people playing golf in 2006 than in 2000 (Vitello, 2008). Even more disturbing is the total people who play 25 or more rounds a year (just over twice a month) has declined from 6.9 million in 2000 to 4.6 million in 2005 (Vitello, 2008). These downward trends in actual golf rounds played are causing golf course owners/managers to reevaluate business practices and consider quantitative methods to help predict future demand for golf rounds. These methods provide rounds of golf forecast information that will help them manage their resources (labor, equipment, capital, etc.) more efficiency and ultimately make them more profitable.

In the resort area of Myrtle Beach, SC, the economy is linked to the 3/4 of a billion dollar golf industry. Along with a decrease in the number of people playing golf, the Myrtle Beach Area Chamber of Commerce reports that additional factors, such as volatility of gas prices, are materially decreasing the number of day-trip visits for both golf and shopping. Golf course owners and their general managers are now realizing:

- they must be more efficient in scheduling paid employee hours;
- they need to better plan for concessions and equipment usage and maintenance based on seasonal demand;
- marketing campaigns must be appropriately planned to increase business during slow times, and continue to provide support for peak demand times; and,
- alternative round-scheduling techniques such as the "double-tee," where golfers simultaneously tee off on both the front and back, need to be used to increase capacity on high demand days.

Because tourism demand is characterized by sudden changes in trends and seasonality (Godwin, 2008), rounds of golf forecasting using management science tools and techniques has potential profitability implications for golf course owners and operators.

MICRO-FORECASTING: AN INTERESTING SEASON

An interesting notion came about when the project of forecasting rounds of golf began. Anecdotally, many club pros believe the busiest day of the week is Saturday, followed by Sunday, then Friday declining in order to Monday. However, our analysis reveals that is not exactly the case. Total rounds of golf, summed by day-of-the-week are shown in *Table 1*.

The appearance of Sunday as #2 in the list might come from the traditional rush of tee times on Sunday morning, when the head pro feels like a traffic cop, later taking care of paperwork on Sunday afternoon – perhaps not to notice the emptiness of the course after 3:00 PM. Anecdotally, when several of the cart attendants were asked, "Is Tuesday very busy?" the consensus answer was: "We're always short-handed on Tuesdays. We don't know why."

Table 1. Propensity of Rounds of Golf by Day on the Subject Course

Day of Week	Rounds	Percent
Monday	9,910	13.01%
Tuesday	12,562	16.49%
Wednesday	9,217	12.10%
Thursday	10,996	14.43%
Friday	10,944	14.36%
Saturday	12,643	16.59%
Sunday	9,927	13.03%

QUANTITATIVE ROUND FORECASTING

Rounds of golf are a form of perishable good, just like hotel rooms and airline seats (Kimes, 2000 & 2002). Demand forecasting models traditionally include:

- time-series extrapolative methods, such as exponential smoothing;
- seasonal models such as ARIMA; and
- predictive models such as regression.

Reducing uncertainty in future demand of rounds of golf can help golf course managers better plan business activities such as marketing strategies, efficient allocation of human resources and machinery management.

This study uses the data shown in *Table 2* as a beginning point for the analysis. *Table 2* shows the rounds of golf played at a subject course.

Table 2. Rounds of Golf for the Subject Course

Month	F.Y. 2005-2006	F.Y. 2006-2007	F.Y. 2007-2008
July	1,472	4,085	2,897
August	2,084	3,486	3,194
September	2,592	3,452	2,983
October	2,416	4,427	3,570
November	1,230	3,683	3,550
December	2,003	2,663	1,892
January	3,038	3,286	2,519
February	5,659	3,890	3,611
March	5,218	6,104	4,836
April	5,630	5,054	4,369
May	3,211	3,461	3,132
June	3,223	2,542	2,364

We first determine if the data exhibits randomness (stationary) or has elements of seasonality and/or trend. Two methods are commonly used to determine if data is not random. This section follows developments found in Albright, Winston and Zappe (2006, pp. 724-729).

*Table 3. Runs Test for Randomness**

Month	Year	Rounds of Golf	Runs
JUL	2005	1472	down
AUG	2005	2084	down
SEP	2005	2594	down
OCT	2005	2416	down
NOV	2005	1230	down
DEC	2005	2003	down
JAN	2006	3038	down
FEB	2006	5659	up
MAR	2006	5218	up
APR	2006	5630	up
MAY	2006	3211	down
JUN	2006	3223	down
JUL	2006	4085	up
AUG	2006	3486	up
SEP	2006	3452	up
OCT	2006	4428	up
NOV	2006	3683	up
DEC	2006	2663	down
JAN	2007	3286	down
FEB	2007	3890	up
MAR	2007	6104	up
APR	2007	5054	up
MAY	2007	3461	down
JUN	2007	2942	down
JUL	2007	2897	down
AUG	2007	3194	down
SEP	2007	2983	down
OCT	2007	3570	up
NOV	2007	3550	up
DEC	2007	1892	down
JAN	2008	2519	down
FEB	2008	3611	up
MAR	2008	4836	up
APR	2008	4369	up
MAY	2008	3132	down
JUN	2008	2364	down

**Runs were computed based on whether rounds of golf were above (up) or below (down) the average rounds of golf over the 36-month period of 3479.74 rounds.*

The runs test, also known as the Wald-Wolfowitz test, is a nonparametric test that tests a randomness hypothesis for a sequence of data with two values. If there are too many or too few runs in a series, one concludes the series is not random (Wald & Wolfowitz, 1951). To construct this test, the rounds of golf in the first column of *Table 3* are used to compute "up" or "down" in column four based on whether the rounds are above or below the base value (average rounds of golf for the 36 months of data) of 3479.74 in *Table 3*. This yields 11 "runs."

$$Z = (|2n_1n_2/N - r| +/- c) / sqrt([2n_1n_2/N]/ [(2n_1n_2 - N)/(N^2 - N)]) \quad [1]$$

The Wald and Wolfowitz formula [1] is used with Yates correction:

to generate a z-score to test the hypotheses:

- H_0: There are not too few or too many runs (indicating randomness)
- H_1: There are too few or too many runs (indicating potentiality for seasonality and/or trend

where:

- $n_1 = 5$ (ups)
- $n_2 = 6$ (downs)
- $N = n_1+n_2 = 11$
- $r = 11$ (number of runs)
- c = Yates correction factor:
    - +0.5 if $r < 2 n_1n_2/N$
    - -1.5 if $r > 2 n_1n_2/N$

The computed Z was 12.58 or 9.09, which are both greater than 1.96, leading to the inference of rejecting the null hypothesis at $\alpha = 0.05$. We therefore conclude the data is not random and has the potentiality for seasonality and/or trend.

When successive observations in a data time series are correlated with one another, the degree and extent of autocorrelation needs to be examined. Three common forms of autocorrelation are:

- large observations follow large observations;
- small observations tend to follow small observations; and,
- seasonal lag occurs at lag 12, corresponding to a relation between observations a year apart.

Under the assumption of randomness, the *standard error* of any autocorrelation is approximately $1/T^{1/2}$, where T is the number of observations. In this study, $1/T^{1/2} = 1/(24)^{1/2}$ or 0.2041.

Table 4. Correlations Between Monthly Rounds of Golf and Lags

Lag (in months)	Correlation
1	+0.6006
2	+0.1442
3	-0.1582
4	-0.1357
5	-0.1034
6	-0.0988
7	-0.1901
8	-0.2655
9	-0.4262
10	-0.2679
11	+0.1661
12	+0.5083

Based on the correlation coefficients found in *Table 4*, computed with lags of one month (next month) to 12 months (same month in next year), one finds two correlations greater than two standard errors of magnitude +/-0.4082, derived from (0.2041)x(2). These are:

- Lag of 1: +0.6006
- Lag of 9: -0.4262
- Lag of 12: +0.5083

Thus, one concludes the data is seasonal, on an annual basis.

Table 5 shows traditional demand forecasting with Holt-Winter's Additive Method compared to a naïve forecast (previous month last year). Spreadsheets were developed to implement algorithms for Stationary Data with Additive Seasonal Effects and Holt-Winter's Additive Method, patterned after models found in Ragsdale (2007; pp. 500-503, pp. 514-518). In *Table 5*, MAPE is the mean average percent error, MAD is the mean absolute deviation, and MSE is the mean squared error.

Linear programming (Microsoft Solver) was used in conjunction with the spreadsheet to compute results. Alpha, beta and gamma were constrained to be in the interval [0,1]. Note the trend parameter (beta) is zero, indicating an essentially stationary seasonal model.

Table 5. Forecasting Rounds of Golf with Holt-Winters Additive Seasonal Adjustment

Method	Parameters	MAPE	MAD	MSE
Holt-Winters Additive	α=.0.274/β=0/γ=0.268	21.790	692.515	1,041,802
Naïve (same as previous year)		25.536	868.167	1,284,270

FORECASTING ADJUSTMENTS WITH AHP

The Analytic Hierarchy Process (AHP) was used to adjust the forecasts (Saaty, 1980, 2008). AHP has been successfully used to provide adjustment factors for demand forecasting in a five-star hotel in Ankara (Yuksel, 2007). The technique evaluates the following progressive levels of granularity:

- The GOAL was the forecasting adjustment of tourist rounds of golf (TROG).

- The CRITERIA are major groupings of factors that would warrant adjustment of a forecast.
- The ALTERNATIVES are potential events, at a smaller level of granularity, that would result in a specific increase or decrease in a forecast.

The objective and alternatives, originally based on predicting hotel demand, were modified to reflect the domain of TROG (Yuksel, 2007). A panel of four experts was polled to help modify the TROG criteria, as well as to help weight the actual affect they would have on forecasting TROG. The panel includes the General Manager (GM), the Director of Golf (DG), a Class A PGA golf professional, and two assistant PGA professionals. Saaty (2008) recommends a scale of 9, which is more expansive than the traditional five-point Likert scale, where 1 is not at all important, 3 is of moderate importance, 6 is of strong importance, and 9 is of highest importance. The relative weights of the alternatives and factors obtained are found in *Table 6*.

The next step was to determine an appropriate set of adjustments for each of the alternatives. The GM and DG were asked to rate the factors, as they were the only two individuals with comprehensive knowledge of the golf course and its operations. A consensus was reached between the GM and DG for the weights used to adjust the forecasts for July, August and September. A table of the initial adjustment factors to be used for the three months is found in *Appendix A*. The AHP-Adjusted forecasts using Holt Winter's Additive Method are listed in *Table 7*.

While the August forecast had zero error, the July and September forecasts had almost 10% and 15% error, respectively. The GM and DG were asked to re-think the adjustment factors.

Table 6. Weights of Criteria and Alternatives

Criteria	Alternatives	Score	% Score	Normalized
International and National Events	Currency exchange rate	5.00	0.3704	0.0325
	International events	4.25	0.3148	0.0276
	Major economic news	4.25	0.3148	0.0276
	Political climate	5.75	0.3433	0.0522
	Cost of travel (gas, airfares, etc.)	7.00	0.4179	0.0635
Local Activities	Road and local construction	5.00	0.1754	0.0236
	Local activities, holidays, festivals	3.25	0.1140	0.0153
	Group marketing	3.00	0.1053	0.0142
	Local Tournaments	4.50	0.1579	0.0212
	General round demand	6.00	0.2105	0.0283
Course Criteria	Non-Internet marketing activities	7.25	0.1754	0.0324
	Internet-based marketing activities	4.25	0.1140	0.0190
	Course condition	7.50	0.1053	0.0335
	Course availability	7.50	0.1579	0.0335
	Maintenance activities	7.25	0.2105	0.0324
	Renovation activities	5.50	0.2368	0.0246
	Pricing	4.50	0.1146	0.0154
	Special events	7.25	0.1847	0.0248
	Merchandise	7.25	0.1847	0.0248
	Food and beverage	6.25	0.1592	0.0214
	Service (staff) quality	6.25	0.1592	0.0214
Natural Events	Hurricanes and major weather events	7.25	0.1847	0.0266
	Excessively wet weather	7.50	0.2778	0.0439
	Excessively hot weather	6.50	0.2497	0.0380
	Excessively cold weather	7.00	0.1953	0.0409

It was determined that some of the adjustments used were actually built into the seasonality of the model itself. In particular, the major changes made to the adjustment factors were as follows:

- The effect of local tournaments was overstated and would be accounted for in the seasonality factor.
- In a similar manner, excessively hot, cold and wet weather would be accounted for in the seasonality factor.
- The political climate was determined to not have an effect on rounds in July through September, so it was adjusted to zero.
- General demand for rounds would be accounted for in the seasonality factor.

- Pricing was determined to be equally competitive to other courses in the pricing tier (under $76 per round) and thus not a factor that needed adjusting.

The revised adjustment factors may be found in *Appendix B*. *Table 8* shows the resulting improvement of forecasts, where the MAD for July-September decreased from 234 to 161, and the MAPE decreased from 8.2% to 5.6%.

The revised adjustment factors were then used in the development of a forecast for October rounds of golf. The forecast, actual rounds played, absolute deviation and percent deviation for October may be found in *Table 9*. The October forecast turned out to have an absolute deviation of 99, which is less that the Revised MAD of 161. In a similar manner, the October forecast had a percent deviation of 3.5%, less than the Revised MAPE of 5.5. Results of the forecast may be found in *Appendix D*.

Table 7. Initial Forecasts for July, August, and September

Mo.	Holt-Winters	AHP Adj. Factor	Final Predict.	Actual Rounds	Abs. Dev. Holt-Winters	Abs. Dev. Holt-Winters With AHP Ad.	% Deviation Holt-Winters With AHP Ad.
JUL	2,793	18.68%	3,315	3,035	522	280	9.24%
AUG	2,896	0.21%	2,903	2,903	7	0	0.00%
SEP	2,882	10.26%	3,178	2,851	296	421	15.29%
AVG					275	234	8.18%

Table 8. Revised Forecasts for July, August, and September

Mo.	Holt-Winters	AHP Adj. Factor	Final Predict.	Actual Rounds	Absolute Deviation	Percent Deviation
JUL	2,793	14.78%	3,206	3,035	171	5.64%
AUG	2,896	5.34%	3,051	2,903	148	5.12%
SEP	2,882	1.33%	2,921	2,851	164	5.95%
AVERAGE					161	5.57%

Table 9. Forecast and Actual Rounds for October

Mo.	Holt Winters	AHP Adj. Factor	Final Predict.	Actual Rounds	Absolute Deviation	Percent Deviation
OCT	3,007	-3.49%	2,902	2,803	99	3.54%

CONCLUSIONS

Quantitative forecasting methods are new to the area of forecasting tourist rounds of golf (TROG). This study, conducted between June 2008 and October 2008 is a first step in determining factors that affect TROG at one course in the Myrtle Beach, SC area. With uncertainty in many factors, such as the economy and fuel prices, Myrtle Beach golf courses need better tools and techniques to forecast TROG.

Holt-Winters Additive method was used to generate a forecast for the three month period July-September 2008. The forecast was adjusted with factors from an Analytical Hierarchy process. For the three month period, the average percent deviation was found to be 8.2% (*Table 7*). Once AHP adjustment factors were revised (*Appendix B*), the average percent deviation was reduced to 5.6% (*Table 8*). The revised adjustment factors were then used to create a forecast for October 2008 (*Appendix C*). The forecasted rounds of golf for October, using Holt-Winters Additive Method along with adjustment factors from AHP yielded a forecast with 3.5% error (*Table 9*).

Two observations that have come out of the knowledge engineering in the AHP process include:

- There are two types of forecast adjustments. Fixed adjustments are those that one always makes, such as -1 for Hurricanes in September. Variable adjustments are those based on planned (and other events) as they occur.

- There are two ways for a course to increase rounds of golf: to bring in more people, independent of other courses and to actively seek business when other competing courses are fully booked.

A related, but more complex problem, is that of forecasting daily golf rounds. Factors that have been identified in this decidedly more difficult endeavor include:

- Collecting, storing and analyzing weather forecast data;
- Determining if a day provides an opportunity for golf based on precipitation and temperature; and,
- Adjusting for holidays that do not occur on the same day each year, such as Easter, Memorial Day, Labor Day, Thanksgiving, Hanukkah, and Christmas.

Additional research is needed to further validate and improve the forecasting techniques for rounds of golf.

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Appendix A. Original Weights and Adjustments

	Weights for Alternatives			Adjustment Factor for Each Alternative		
	JUL	**AUG**	**SEP**	**JUL**	**AUG**	**SEP**
International and National Events						
Currency exchange rate	0	0	0	0.0000	0.0000	0.0000
International events	0	0	0	0.0000	0.0000	0.0000
Major economic news	-0.5	-0.5	-0.5	-0.0205	-0.0205	-0.0205
Political climate	-1	-1	-1	-0.0493	-0.0493	-0.0493
Cost of travel (gas, airfares, etc.)	0	0	0	0.0000	0.0000	0.0000
Local Activities						
Road and local construction	0	0	0	0.0000	0.0000	0.0000
Local activities, holidays, festivals	-0.5	-0.5	-0.5	-0.0205	-0.0205	-0.0205
Group marketing	0	0	0	0.0000	0.0000	0.0000
Local Tournaments	1	0	3	0.0472	0.0000	0.1417
General round demand	0	0.5	1	0.0000	0.0267	0.0534
Course Criteria						
Non-Internet marketing activities	0	0	0	0.0000	0.0000	0.0000
Internet-based marketing activities	0	0	0	0.0000	0.0000	0.0000
Course condition	2	1	1	0.0944	0.0472	0.0472
Course availability	0.5	0.5	-0.5	0.0185	0.0185	-0.0185
Maintenance activities	0	0	0	0.0000	0.0000	0.0000
Renovation activities	0	0	0	0.0000	0.0000	0.0000
Pricing	0.5	0.5	0.5	0.0246	0.0246	0.0246
Special events	2	0	0	0.0944	0.0000	0.0000
Merchandise	0	0	0	0.0000	0.0000	0.0000
Food and beverage	0	0	0	0.0000	0.0000	0.0000
Service (staff) quality	0	0	0	0.0000	0.0000	0.0000
Natural Events						
Hurricanes and major weather events	0	0	-1	0.0000	0.0000	-0.0411
Excessively wet weather	0	0	-0.5	0.0000	0.0000	-0.0164
Excessively hot weather	-1	-1	-0.5	-0.0452	-0.0452	-0.0226
Excessively cold weather	0	0	0	0.0000	0.0000	0.0000
TOTALS				0.1868	0.0021	0.1026

Appendix B. Revised Weights and Adjustments for July, August and September

List of Alternatives by Category	Weights for Alternatives			Adjustment Factor for Each Alternative		
	JUL	AUG	SEP	JUL	AUG	SEP
International and National Events						
Currency exchange rate	0	0	0	0.0000	0.0000	0.0000
International events	0	0	0	0.0000	0.0000	0.0000
Major economic news	-0.5	-0.5	-0.5	-0.0205	-0.0205	-0.0205
Political climate	0	0	0	0.0000	0.0000	0.0000
Cost of travel (gas, airfares, etc.)	0	0	0	0.0000	0.0000	0.0000
Local Activities						
Road and local construction	0	0	0	0.0000	0.0000	0.0000
Local activities, holidays, festivals	-0.5	-0.5	-0.5	-0.0205	-0.0205	-0.0205
Group marketing	0	0	0	0.0000	0.0000	0.0000
Local Tournaments	1	0	1.5	0.0472	0.0000	0.0472
General round demand	0	0	0	0.0000	0.0000	-0.0534
Course Criteria						
Non-Internet marketing activities	0	0	0	0.0000	0.0000	0.0000
Internet-based marketing activities	0	0	0	0.0000	0.0000	0.0000
Course condition	2	1	1	0.0944	0.0472	0.0472
Course availability	0	0	0	0.0000	0.0000	0.0000
Maintenance activities	0	0	0	0.0000	0.0000	0.0000
Renovation activities	0	0	0	0.0000	0.0000	0.0000
Pricing within tier	0	0	0	0.0000	0.0000	0.0000
Special events	2	0	0	0.0944	0.0000	0.0000
Merchandise	0	0	0	0.0000	0.0000	0.0000
Food and beverage	0	0	0	0.0000	0.0000	0.0000
Service (staff) quality	0	0	0	0.0000	0.0000	0.0000
Natural Events						
Hurricanes and major weather events	0	0	-1	0.0000	0.0000	-0.0411
Excessively wet weather	0	0	0	0.0000	0.0000	0.0000
Excessively hot weather	0	0	0	0.0000	0.0000	0.0000
Excessively cold weather	0	0	0	0.0000	0.0000	0.0000
TOTALS				0.1478	0.0534	0.0133

Appendix C. Weights and Adjustments – October

List of Alternatives by Category	Weights for Alternatives OCT	Adjustments for Each Alternative OCT
International and National Events		
Currency exchange rate	0	0.0000
International events	0	0.0000
Major economic news	-1	-0.0411
Political climate	-0.5	-0.0246
Cost of travel (gas, airfares, etc.)	0	0.0000
Local Activities		
Road and local construction	0	0.0000
Local activities, holidays, festivals	0	0.0000
Group marketing	0	0.0000
Local Tournaments	0	0.0000
General round demand	0	0.0000
Course Criteria		
Non-Internet marketing activities	0	0.0000
Internet-based marketing activities	0	0.0000
Course condition	1	0.0472
Course availability	0	0.0000
Maintenance activities	-0.5	-0.0164
Renovation activities	0	0.0000
Pricing	0	0.0000
Special events	0	0.0000
Merchandise	0	0.0000
Food and beverage	0	0.0000
Service (staff) quality	0	0.0000
Natural Events		
Hurricanes and major weather events	0	0.0000
Excessively wet weather	0	0.0000
Excessively hot weather	0	0.0000
Excessively cold weather	0	0.0000
TOTAL		-0.0349

Appendix D. Results of Holt Winters Additive Forecast

Holt-Winters Additive

Per	Year	MO	Rounds	Base	Trend	Seasonality	Forecast	ABS DEV		
1	2005	JUL	1472			-1676.167			alpha	0.274
2	2005	AUG	2084			-1064.167			beta	0.000
3	2005	SEP	2594			-554.167			gamma	0.268
4	2005	OCT	2416			-732.167				
5	2005	NOV	1230			-1918.167			MSE	1,041,802
6	2005	DEC	2003			-1145.167			MAD	692.515
7	2006	JAN	3038			-110.167			MAPE	21.790
8	2006	FEB	5659			2510.833				
9	2006	MAR	5218			2069.833				
10	2006	APR	5630			2481.833				
11	2006	MAY	3211			62.833				
12	2006	JUN	3223	3148.167	0.000	74.833				
13	2006	JUL	4085	3863.707	0.000	-389.560	1472.000	2613.000		
14	2006	AUG	3486	4051.686	0.000	-436.413	2799.540	686.460		
15	2006	SEP	3486	4048.532	0.000	-299.010	3497.519	11.519		
16	2006	OCT	4428	4352.940	0.000	-175.948	3316.365	1111.635		
17	2006	NOV	3683	4694.753	0.000	-784.522	2434.773	1248.227		
18	2006	DEC	2663	4451.971	0.000	-785.652	3549.586	886.586		
19	2007	JAN	3286	4162.851	0.000	-264.286	4341.805	1055.805		
20	2007	FEB	3890	3400.571	0.000	803.358	6673.685	2783.685		
21	2007	MAR	6104	3574.074	0.000	1231.643	5470.404	633.596		
22	2007	APR	5054	3299.713	0.000	1134.274	6055.907	1001.907		
23	2007	MAY	3461	3326.674	0.000	52.792	3362.547	98.453		
24	2007	JUN	2942	3200.843	0.000	-49.271	3401.507	459.507		
25	2007	JUL	2897	3224.316	0.000	-191.952	2811.282	85.718		
26	2007	AUG	3194	3335.521	0.000	-154.749	2787.902	406.098		
27	2007	SEP	2983	3320.867	0.000	-170.532	3036.511	53.511		
28	2007	OCT	3570	3437.271	0.000	-11.573	3144.919	425.081		
29	2007	NOV	3550	3682.973	0.000	-245.671	2652.749	897.251		
30	2007	DEC	1892	3407.677	0.000	-616.210	2897.321	1005.321		
31	2008	JAN	2519	3236.695	0.000	-262.938	3143.391	624.391		
32	2008	FEB	3611	3119.204	0.000	346.794	4040.053	429.053		
33	2008	MAR	4836	3252.058	0.000	753.908	4350.847	485.153		
34	2008	APR	4369	3247.312	0.000	604.062	4386.331	17.331		
35	2008	MAY	3132	3201.278	0.000	-4.414	3300.104	168.104		
36	2008	JUN	2364	2985.492	0.000	-179.605	3152.007	788.007		
37	2008	JUL	3035	3051.613	0.000	-55.846	2793.539	241.461		
38	2008	AUG	2903	3053.293	0.000	-81.679	2896.864	6.136		
39	2008	SEP	2757	3018.855	0.000	-115.777	2882.761	125.761		
40	2008	OCT	2803	2962.915	0.000	-45.918	3007.282	204.282		

YR	MO	Forecast	AHP Factor	Adjusted for AHP	ACTUAL ROUNDS	ABS DEV	PCT DEV
2008	JUL	2793.539	0.1478	3206.42	3035	171.424	5.648%
2008	AUG	2896.864	0.0534	3051.56	2903	148.556	5.117%
2008	SEP	2882.761	0.0133	2921.10	2757	164.102	5.952%
2008	OCT	3007.282	-0.0349	2902.33	2803	99.3281	3.544%