Will we make the month end "target" number?

Posted on Jan 04, Posted by <u>Tom Reilly</u> Category <u>Forecasting</u>

Everyone is asked this question.

Everyone tries to answer it.

Everyone wants the "Early Warning" and quarter end numbers for "the street". Finance or Accounting are often asked by the organization to make these projections, but the truth is (and hurts) that they don't have the time series analysis tools and awareness needed to provide a good forecast.

The question is "Are you using your modeling skills to help you answer that question" or are you using simple averaging and ratio estimates to figure this one out?

We were asked at a Forecasting Conference by a P&G employee how to do this. They had NOT identified the change in level down due to the financial crises in 2008. Why? They were using simple approaches to forecast to a not so simple problem. You need to model the data to do it correctly and not just blindly apply back of the envelope methods.

The problem is that when you use simple methods like ratio estimates you are assuming that Wednesday's behave the same as Saturdays. That assumption is the problem. Less likely, but often we see the first few days of the month stronger due to a paycheck effect. So, the first few days are an outlier and yet they are being used to project. The wrong way to forecast the month end number is like this:

We are 5 days into the month and we want to forecast the expected month end number. We take the first 5 days revenue/sales(ie \$47,000). We take the number of days in a month (ie 30) and take 30 and divide it by 5 which results in a factor of 6. We multiply 6 by the 5 days of

revenue and that is the forecast. $47,000^{*}6=282,000$.

The report you should be getting from your statistical software should look like this. It provides a table of forecasts and the probability of making different numbers. This allows you to interpolate your target number to find out where you stand using statistics and not simplistic division and multiplication. Different levels of statistical confidence are set and the history plus the forecast are aggregated to provide a month end number. The expected forecast is the 50% confidence level.

PROBABILITY FORECAST

99.862335 17521950.24

99.740551 17804768.87

99.528383 18087587.5

99.172964 18370406.13

98.600522 18653224.75

97.714171 18936043.38

96.394897 19218862.01

94.507447 19501680.64

91.911957 19784499.27

88.481731 20067317.9

84.124939 20350136.53

78.806855 20632955.15

72.569247 20915773.78

65.538755 21198592.41

57.924343 21481411.04

57.924343 21481411.04

50 21764229.67

42.075657 22047048.3

34.461245 22329866.93

27.430753 22612685.56

21.193145 22895504.18

15.875062 23178322.81

11.518269 23461141.44

8.088043 23743960.07

5.492553 24026778.7

3.605103 24309597.33

2.285829 24592415.96

1.399478 24875234.59

0.827036 25158053.21

0.471617 25440871.84

0.259449 25723690.47

0.137665 26006509.1

To do this properly, you need to model the data using daily data. We recommend about 3 years of historical data. You need to consider all of these issues:

Day of the week effects, Seasonality, Trends, Holiday effects, Day of the month effects, outliers, Lead/Lags around Holidays, changes in seasonality(ie Saturdays are high and then over time becomes like the other days of the week)

Once you build a model that is sophisticated to truly model and understand the patterns within the data, you can then forecast with a reduced level of bias. Let's describe SOME of the different components in this model now

1)The average demand is 148k 2)Demand is low by 241k on Women's Day - note that this is data from South Africa 3)The day before Reconciliation Day is high by 113k 4)MONTH_EFF09 means Septembers are typically low by 11k 5)FIXED_EFF_N10107 means that the first day of the week is low by 164k Note that the data begins on 7/1/2007 which is a Sunday 6)WKINM01 means that the first week of the month is high by 64k 7)FIXED_DAY01 means that the first day of the month is low by 56k 8)SEASONAL PULSE beginning at 164/ 2 8/16/2010 means that volume AT or ABOUT on Mondays became higher by 152k starting on 8/16/2010 9)LEVEL SHIFT beginning at 7/30/2010 found overall volume to be higher by 21k. 10)PULSE outlier found on 11/1/2010 was low by 368k. The 41 outliers are reported by importance statistically.

Series __07010796RRAE

Y(T) = .14855E+06

+[X1(T)][(-

G_WOMEN +[X2(T)][(- .18020E+06)] .24148E+06)] G HERITAGE +[X3(T)][(+ .11308E+06B**-1- .25778E+06+ .18230E+06B** 1 + .23546E+06B** 2+ .19179E+06B** 3+ .18266E+06B** +[X4(T)][(+ .16671E+06B**-3+ .17821E+06B**-2+ 5)1 G RECONCILE .15050E+06B**-1 - .22621E+06- .19222E+06B** 1)] M XMAS +[X5(T)][(+ .31591E+06B**-4+ .17758E+06B**-3+ 64947. B**-2 - .21378E+06)] +[X6(T)][(- 72258. B**-3- .20193E+06B**-2+ 87829. B**-1 M NEWYEARS - .20174E+06B** 1)] M EASTER +[X7(T)][(- .23159E+06+ 94924. B** 1)] G FREEDOM +[X8(T)][(+ 90703. B**-2+ 49047. B**-1- .18390E+06)] G_WORKERS +[X9(T)][(- .23416E+06+ 51151. B** 1+ 76470. B** 2)] G YOUTH +[X10(T)[(- 11845.)] MONTH EFF09 +[X11(T)[(- 21861.)] MONTH EFF10 +[X12(T)[(- 17001. MONTH EFF11 +[X13(T)[(- 20620.)])] MONTH EFF01 +[X14(T)[(- 29782.)] MONTH EFF02 MONTH EFF03 +[X15(T)[(- 13982.)] +[X16(T)[(- 11262. MONTH EFF04 +[X17(T)[(- .16496E+06)])] FIXED EFF N10107 +[X18(T)](+ .13591E+06)] FIXED EFF N10307 +[X19(T)[(+ 87981.)] FIXED EFF N10407 +[X20(T)[(+ 38655.)] FIXED EFF N10507 +[X21(T)[(+ 25474.)] FIXED EFF N10607 +[X22(T)[(+ 64857.)] WKINM01 +[X23(T)[(- 56641.)] FIXED DAY01 +[X24(T)[(+ 46855.)] FIXED DAY08 +[X25(T)[(+ 44857.)] FIXED DAY09 +[X26(T)[(+ 22607.)] FIXED DAY10 +[X27(T)[(+ 17102.)] FIXED DAY17 +[X28(T)[(+ .15233E+06)] :SEASONAL PULSE 1143 164/ 2 8/16/2010 I~S01143 07010796RRAE +[X29(T)[(+ 21070.)] :LEVEL SHIFT 1126 161/ 6 7/30/2010 I~L01126 07010796RRAE +[X30(T)](-:PULSE 1220 175/ 2 11/ 1/2010 .36860E+06)] +[X31(T)[(- .37728E+06)] I~P01220 07010796RRAE :PULSE 25/ 2 12/17/2007 I~P00170 07010796RRAE +[X32(T)](- 32079. 170 :LEVEL SHIFT 417 60/ 4 8/20/2008)] I~L00417 07010796RRAE +[X33(T)](- .29897E+06)] :PULSE 153/ 3 6/ 1/2010 I~P01067 07010796RRAE +[X34(T)](+ 29329. 1067 :LEVEL SHIFT 139 20/ 6 11/16/2007)] I~L00139 07010796RRAE +[X35(T)[(- .28982E+06)] :PULSE 162/ 2 8/ 2/2010 I~P01129 07010796RRAE 1129 +[X36(T)[(+ .19134E+06)] :PULSE 536 77/ 4 12/17/2008 I~P00536 07010796RRAE +[X37(T)[(- .26880E+06)] :PULSE 1038 149/ 2 5/ 3/2010 I~P01038 07010796RRAE +[X38(T)[(-.22253E+06)] :PULSE 662 95/ 4 4/22/2009 +[X39(T)[(- .26024E+06)] I~P00662 07010796RRAE :PULSE 1159 166/ 4 9/ 1/2010 I~P01159 07010796RRAE +[X40(T)[(-79/ 1 12/28/2008 .29674E+06)] :PULSE 547 +[X41(T)[(- .30180E+06)] I~P00547_07010796RRAE :PULSE

171 25/ 3 12/18/2007 I~P00171 07010796RRAE +[X42(T)](-.26154E+06)] :PULSE 303 44/ 2 4/28/2008 I~P00303 07010796RRAE +[X43(T)[(+ .17179E+06)] :PULSE 44/ 7 5/3/2008 I~P00308 07010796RRAE 308 +[X44(T)[(+ .21111E+06)] :PULSE 180 26/ 5 12/27/2007 I~P00180 07010796RRAE +[X45(T)[(+ .24487E+06)] :PULSE 25/ 1 12/16/2007 I~P00169 07010796RRAE +[X46(T)[(-169 .20171E+06)] :PULSE 1097 157/ 5 7/ 1/2010 +[X47(T)[(+ .28926E+06)] I~P01097 07010796RRAE :PULSE 173 25/ 5 12/20/2007 I~P00173 07010796RRAE +[X48(T)[(+ :PULSE 1139 163/ 5 8/12/2010 .18024E+06)] I~P01139 07010796RRAE +[X49(T)[(- .21759E+06)] :PULSE +[X50(T)[(+ 772 111/ 2 8/10/2009 I~P00772 07010796RRAE .22993E+06)] :PULSE 302 44/ 1 4/27/2008 +[X51(T)[(- .26803E+06)] I~P00302 07010796RRAE :PULSE 44/ 6 5/ 2/2008 I~P00307 07010796RRAE 307 +[X52(T)](- 15373. :SEASONAL PULSE 833)] 119/ 7 10/10/2009 I~S00833 07010796RRAE +[X53(T)[(- .18772E+06)] :PULSE 170/ 6 10/ 1/2010 I~P01189 07010796RRAE +[X54(T)[(+ 1189 :PULSE .21572E+06)] 771 111/ 1 8/9/2009 I~P00771 07010796RRAE +[X55(T)[(+ 9024.5)] :LEVEL 901 129/ 5 12/17/2009 I~L00901 07010796RRAE SHIFT +[X56(T)](+ 97577.)] :PULSE 367 53/ 3 7/ 1/2008 +[X57(T)[(+ .17982E+06)] I~P00367 07010796RRAE :PULSE 182 26/ 7 12/29/2007 I~P00182 07010796RRAE +[X58(T)[(+ .12688E+06)] :PULSE 312 45/ 4 5/ 7/2008 +[X59(T)](+ .13894E+06)] I~P00312 07010796RRAE :PULSE 45/ 5 5/ 8/2008 I~P00313 07010796RRAE +[X60(T)[(+ 313 .14256E+06)] :PULSE 1040 149/ 4 5/ 5/2010 +[X61(T)[(+ .13974E+06)] I~P01040 07010796RRAE :PULSE 59/ 2 8/11/2008 I~P00408 07010796RRAE +[X62(T)[(-408 .19002E+06)] :PULSE 996 143/ 2 3/22/2010 I~P00996 07010796RRAE +[X63(T)[(+ 49165.)] :SEASONAL 91/ 2 3/23/2009 I~S00632_07010796RRAE PULSE 632 +[X64(T)](+ :SEASONAL PULSE 1088 156/ 3 6/22/2010 29613.)] I~S01088 07010796RRAE +[X65(T)[(+ .14847E+06)] :PULSE 1013 145/ 5 4/8/2010 I~P01013 07010796RRAE +[X66(T)[(+ .12300E+06)] :PULSE 270 39/ 4 3/26/2008 I~P00270 07010796RRAE +[X67(T)[(- .16349E+06)] :PULSE 540 78/ 1 12/21/2008 I~P00540 07010796RRAE +[X68(T)[(-.19112E+06)] :PULSE 176 26/ 1 12/23/2007 I~P00176 07010796RRAE + [A(T)]

This looks easy to do, right?

Tags: