

Estimating Revenues

A degree in statistics is not required! The successful formula for city and county government revenue forecasting involves basic forecast models, constant information gathering and continuous monitoring.

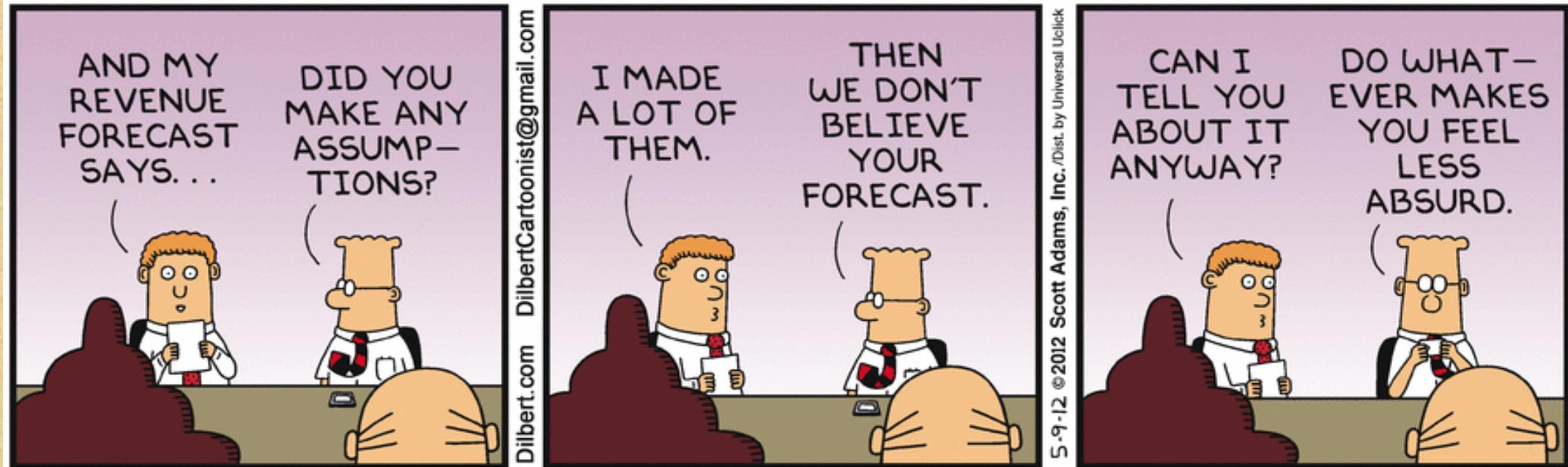
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Why am I here (especially when I hate public speaking)?

- * FGFOA
- * Proven success at revenue forecasting that is easy to replicate
- * Budget Manager



Introduction

- How many have taken more than 5 classes in statistics, econometrics, or financial modeling?
- For how many of you, is it your ONLY job to forecast revenues?
- This is what you will learn today:

A method for an effective revenue forecast that can be done with limited resources, which includes time, that brings confidence to the decision makers.

Introduction

- GFOA published a book in 2016 called “Informed Decision-Making Through Forecasting: A Practitioner’s Guide to Government Revenue Analysis
- We are not going to recreate the wheel, but use their steps for revenue forecasting with some slight modifications.
- I have informally been using these steps for 11 years, with heavy emphasis on a few of the steps

Step 1: Define the Problem

- A method for an effective revenue forecast that can be done with limited resources, which includes time, that brings confidence to the decision makers.
- GFOA recommends 3 questions that should be considered at Step 1
 1. Where should we focus our forecast efforts?
 - Size (20-80 rule)
 - Volatility
 - Particular Fund
 - Largo looks at EVERY individual revenue source
 - Internal audit benefit (variances)
 - Journal Entry Reclass
 - City Manager wants constant evaluation of revenue streams

Step 1: Define the Problem

2. Is there significant growth on the horizon?
 - Estimating revenues for a product life cycle for a business (intro, growth, maturity and decline)
 - A City is very similar in that there could be high, low or no growth in development or in annexation
 - You want revenue estimations to align with the City's strategic plan

3. What political issues might impact the forecast?
 - Statutory limits on property tax increases
 - Elimination of the CST
 - Commission does/does not want to pursue annexation or provide business incentives

Step 2: Gather Information

- Know your Revenues
 - What determines and influences the amount received?
 - Literature
 - Local government documents / fee ordinances
 - Local Government Financial Information Handbook from the Florida Legislature's Office of Economic and Demographic Research
 - Staff involved with the revenue source (general information)
 - Neighboring Communities (Local FGFOA Chapters)
 - Document any info you receive (Revenue Manual) – VERY IMPORTANT STEP
 - Credibility

Step 2: Gather Information

- Know the Financial and Economic Environment / Know Special Events and Emerging Trends
 - WARNING – Do not get bogged down in the details (think big picture)
 - The Difference in small / large governments
 - Economy (recession, recovery, expansion)
 - Trends in the major revenue streams
 - Property Tax (taxable value / new construction)
 - CST
 - Reclaimed Water
 - Golf Course
 - Intention is to verify reasonableness of forecasts

Step 2: Gather Information

- Gather Historical Revenue Data
 - Amount of data (minimum / preferred)
 - Periods of data (monthly and yearly) – dependent on Largo's use
 - Largo uses the data during CIP / Budget / Monitoring
 - CIP (Long Range Financial Plan) uses yearly data
 - Budget (long Range Financial Plan) uses both yearly and monthly data
 - Monitoring uses monthly data (smaller revenues grouped together)
 - All individual revenues are looked at during CIP and Budget

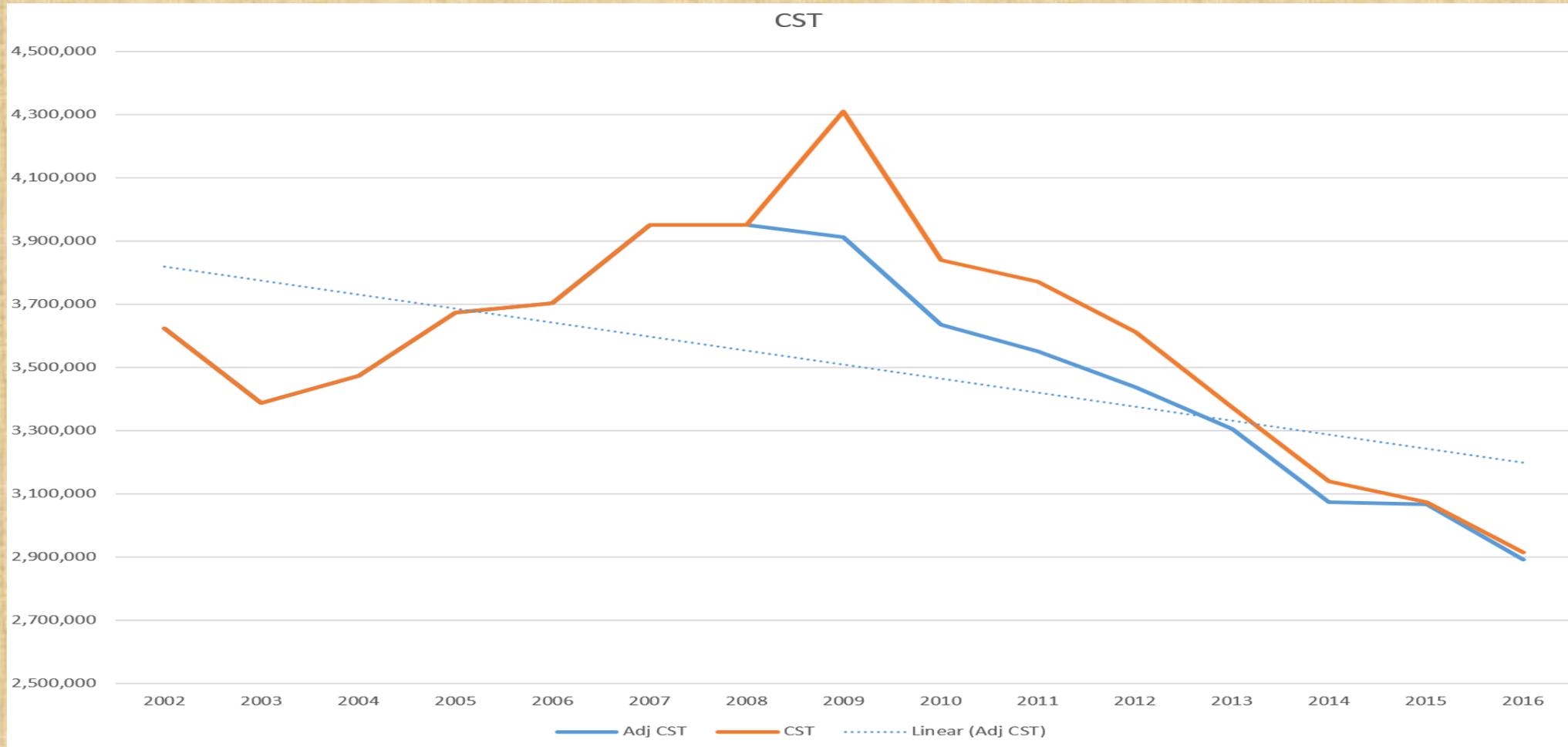
Step 2: Gather Information

- Gather Historical Revenue Data....continued
 - Find and adjust outliers
 - Sewer Pellets out of compliance
 - Adjust one time revenues
 - CST (audit)
 - Policy Changes
 - Utility rate changes
 - Recreation memberships
 - Working with departments
 - Building Division / Engineering Division / Recreation, Parks and Arts Department

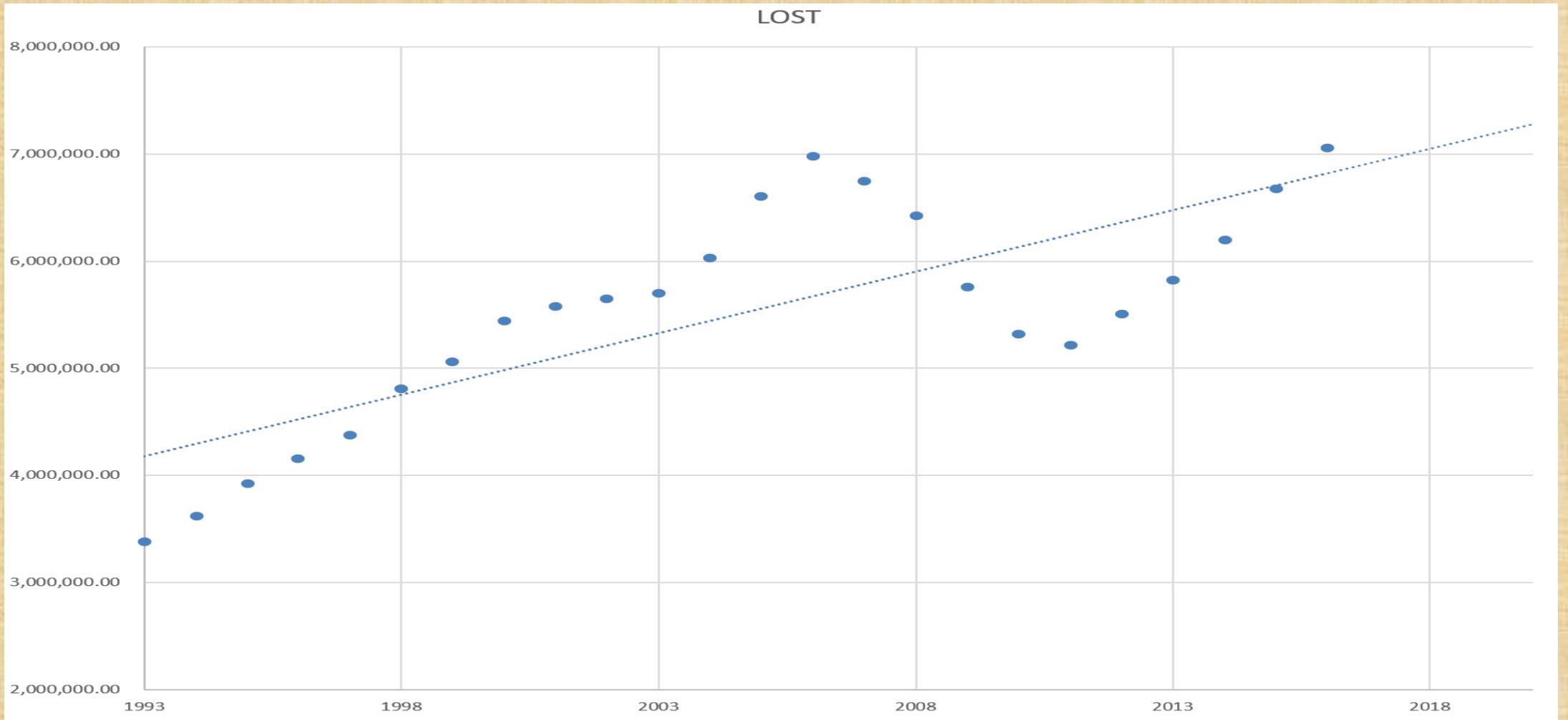
Step 3: Exploratory Analysis

- Data visualization / listed data
- Trends
- Seasonality
 - Correcting Seasonality with Classical Decomposition
 - Largo / Seldom do it unless using Forecast X
- % rate changes tracked / % rate changes analyzed (optional)
 - Descriptive statistics in excel
 - Building Confidence Intervals on % rate changes (mean and standard deviation) -show you during later step

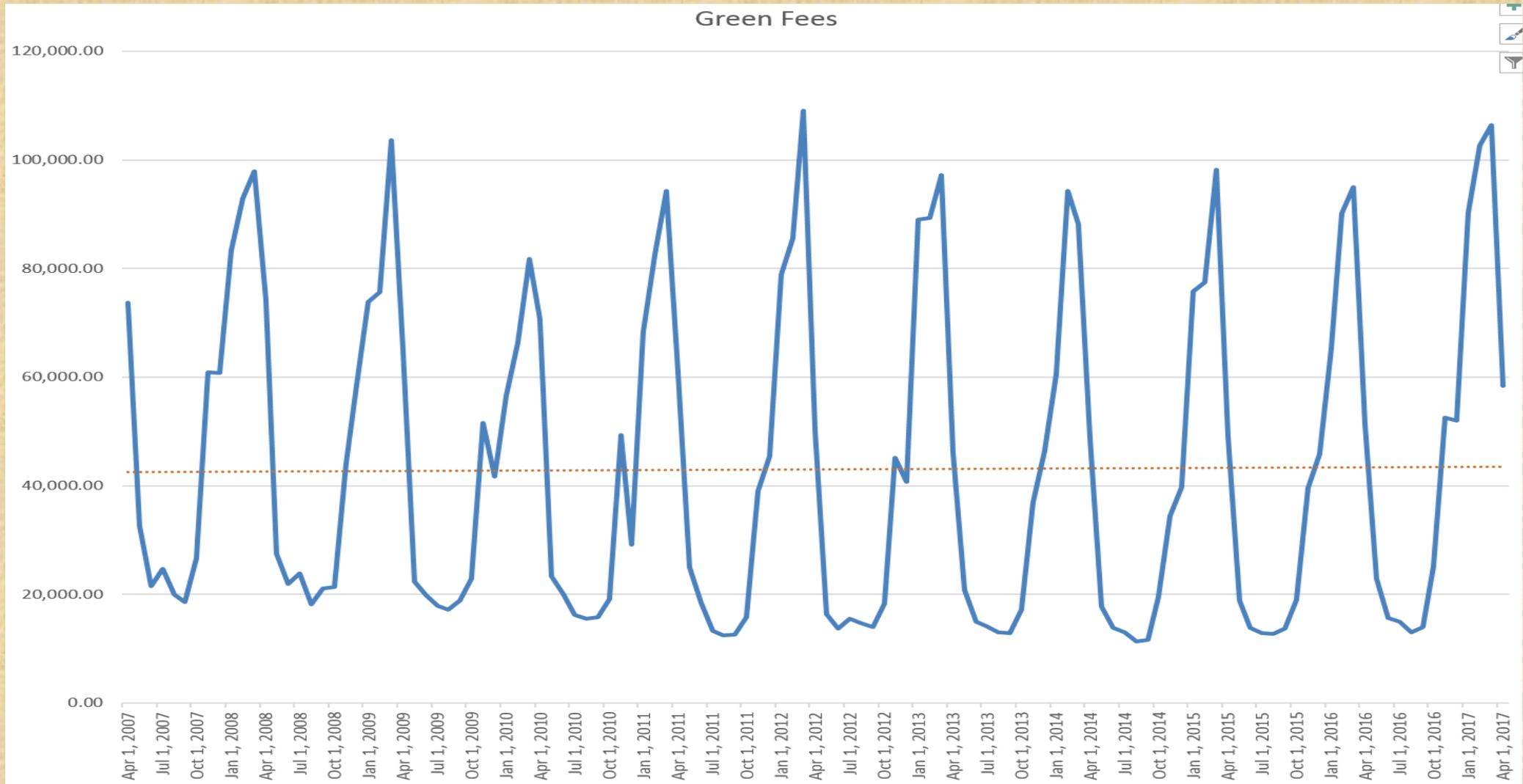
Step 3: Exploratory Analysis



Step 3: Exploratory Analysis



Step 3: Exploratory Analysis



Step 4 & 5: Select & Implement Forecasting Methods

- Step 4:
 - Selecting a Forecasting Method
- Step 5:
 - Implementing a Forecasting Method

To Be Continued!

Step 6: Use Forecasts

- Long Range Financial Plan – 5 years (CIP and Budget)
- Administration views / discusses the Plan in whole
 - structurally balanced (cyclically), sustainability, fund balance, major changes (staffing increases), major projects, etc.
- Administration views / discusses in parts
 - For example: Revenues that roll up into LRFPP are in spreadsheets with actuals, budgeted and forecasted numbers
 - Discuss major discrepancies in data (causes), variances from budget, long term assumptions and consistency (1/2 cent and Local Option Sales Tax)

Step 6: Use Forecasts

- Credibility of the Forecaster
 - Proven Accuracy
 - Knowledge of Revenues (ability to answer specific questions)
 - Ability to Recommend Changes in Assumptions with Sound Reasoning
 - Early years in Largo vs. Current years in Largo
- Objective or Conservative Revenue Forecasts
 - Early years in Largo / Current years in Largo
 - Long Term Forecasts (outer years) - Conservative
- Objective Forecasts Require
 - Appropriate Fund Balance Levels (Established Policies?)
 - Continuous Review and Communication with Management (No Surprises)
- Charts and Graphs – A picture is worth 1,000 words

Step 6: Use Forecasts

CITY OF LARGO													
SCHEDULE OF GENERAL FUND REVENUES - BUDGET & ACTUAL													
SIX MONTHS ENDING MARCH 31, 2017													
	Prior Year				Current Year				Period-to-Date		Annual	Annual	Projected
	FY 16				FY 17				% of Budget		Projections	Projections	Budget
	Total	Total	Period	Period	Total	Period	Total	Received		In FY17	02/01/17	Variance	
	Budget	Actual	to-Date	to-Date	Budget	to-Date	Budget	FY 16	FY 17	CIP	02/01/17	02/01/17	
			Actual	% of Total		Actual							
Property Tax	19,056,000	19,057,388	17,629,707	93%	20,686,000	19,292,585		93%	93%	20,988,300	20,988,300	302,300	
Franchise Fees:													
Electric	6,045,000	5,545,883	2,248,414	41%	5,685,000	2,059,489		37%	36%	5,484,300	5,484,300	-200,700	
Gas	220,000	202,056	56,769	28%	215,000	65,177		26%	30%	210,000	210,000	-5,000	
	6,265,000	5,747,939	2,305,183	40%	5,900,000	2,124,667		37%	36%	5,694,300	5,694,300	-205,700	
Utility Taxes:													
Electric	6,820,000	6,848,804	2,597,651	38%	6,753,500	2,626,591		38%	39%	6,950,000	6,950,000	196,500	
Water	1,200,000	1,249,519	600,165	48%	1,240,000	640,842		50%	52%	1,300,000	1,300,000	60,000	
Gas	213,000	207,488	88,156	42%	205,000	68,512		41%	33%	211,500	211,500	6,500	
Propane/Fuel Oil	88,000	82,165	37,645	46%	88,000	38,204		43%	43%	86,000	86,000	-2,000	
	8,321,000	8,387,976	3,323,617	40%	8,286,500	3,374,149		40%	41%	8,547,500	8,547,500	261,000	
Communications Svcs Tax	3,056,700	2,892,745	989,783	34%	2,927,400	964,571		32%	33%	2,852,400	2,852,400	-75,000	
CST Audit	21,300	21,300	21,300	100%	17,600	17,600		100%	100%	17,600	17,600	0	
	3,078,000	2,914,045	1,011,083	35%	2,945,000	982,171		33%	33%	2,870,000	2,870,000	-75,000	
Business Tax	630,000	628,913	602,326	96%	630,000	620,879		96%	99%	630,000	630,000	0	

Step 6: Use Forecasts

- Revenue and Expense Report
 - Monthly Review and Discuss Information with:
 - Finance Management
 - Management Analysts
 - Quarterly Review with Executive Administration
 - All Funds
- Specifically Address Discrepancies
 - Investigate for Answers (Fire Plan Review Fees / Recyclables (past))
 - Updated Forecast (with monthly data)
 - Budget Amendments or Transfers

Step 7: Evaluate Forecasts

- My favorite part of the process!
- Analyze Forecast in Total, By Fund (important for administration)
- Analyze Forecast by Major Individual Revenues (important for forecaster)
 - Do we need different forecast methods based on results?
 - Never correct, but in theory differences provide more accuracy in total
- Revenue Manuals (or electronic storage)
 - How was it forecasted? Any notes?
 - Keep multiple years (I keep the last 3 years)

Step 7: Evaluate Forecasts

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Revenue Budget	58,363,900	58,579,800	59,044,100	57,781,300	56,770,700	57,354,200	59,149,900	59,917,500	61,463,500	64,448,500
Adjusted Revenue Budget	58,556,000	58,762,400	59,125,700	58,971,000	56,850,700	57,711,400	59,199,900	60,010,000	61,632,800	64,601,700
Actuals	58,470,123	57,528,366	56,748,191	60,264,792	56,843,798	56,815,430	57,362,180	60,447,905	61,447,285	64,501,292
Accuracy of Adj Budget to Actual										
Total Revenues (Act / Adj Budget)	0.99853	0.97900	0.95979	1.02194	0.99988	0.98447	0.96896	1.00730	0.99699	0.99845

Descriptive Statistics

Input
Input Range: 
Grouped By: Columns Rows
 Labels in first column

Output options
 Output Range: 
 New Worksheet Ply:
 New Workbook
 Summary statistics
 Confidence Level for Mean: %
 Kth Largest:
 Kth Smallest:

OK Cancel Help

Step 7: Evaluate Forecasts

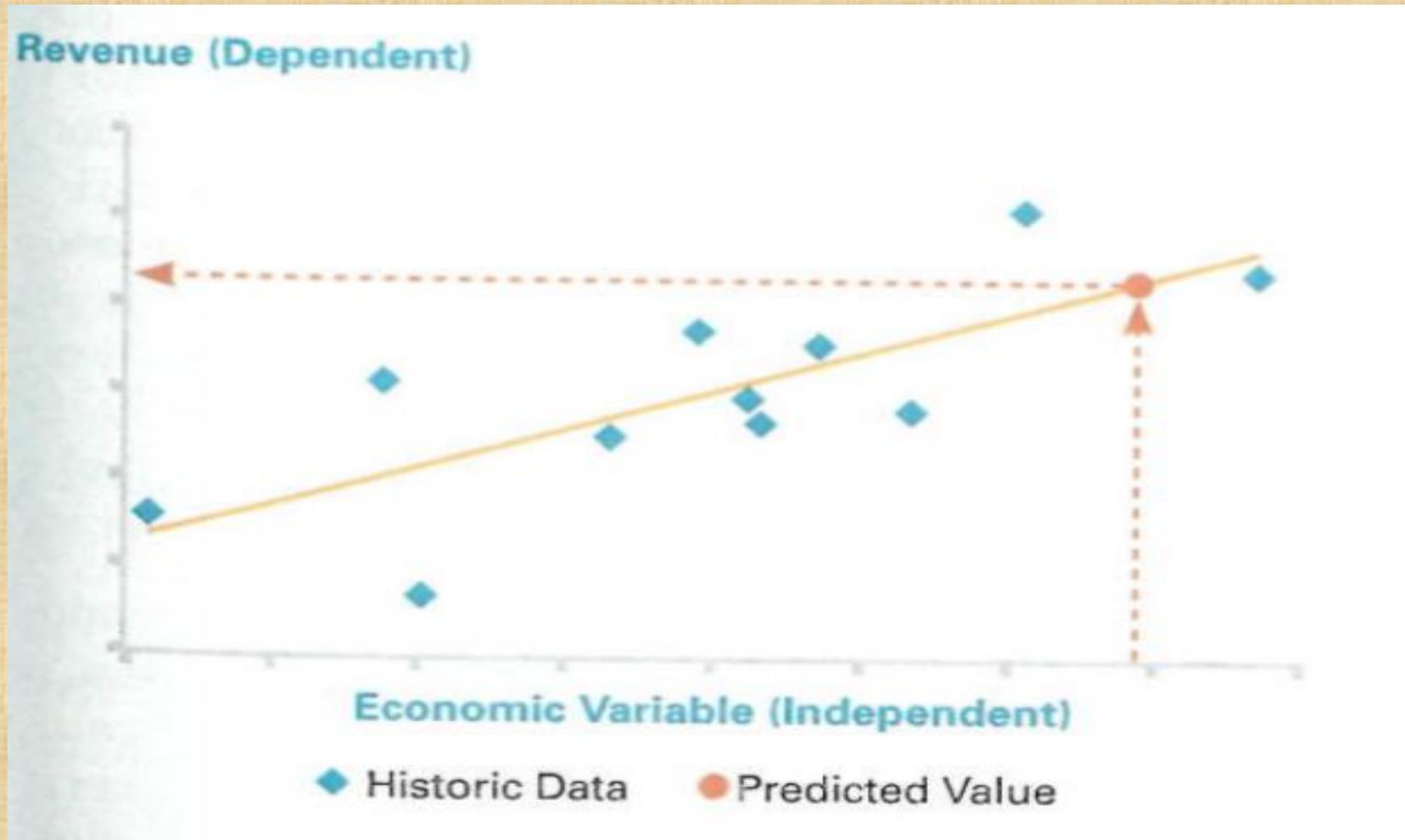
<i>Total Revenues (Act / Adj Budget)</i>		
Mean	0.991530529	
Standard Error	0.005862811	
Median	0.997717867	
Mode	#N/A	
Standard Deviation	0.018539837	
Sample Variance	0.000343726	
Kurtosis	-0.221275664	
Skewness	-0.269041051	
Range	0.062150554	
Minimum	0.959788907	
Maximum	1.021939462	
Sum	9.915305287	
Count	10	
	Min	Max
1 standard deviation - 68%	0.972991	1.010070
2 standard deviations - 95%	0.954451	1.028610
Based on 2016 Budgeted Revenue	64,601,700	
1 standard deviation - 68%	-1,744,847	650,563
2 standard deviations - 95%	-2,942,552	1,848,268

Step 4 & 5: Select & Implement Forecasting Methods

- Quantitative – Historical data (actual revenues and economic factors) and statistical techniques
- Judgmental – Expert knowledge of forecaster
- Quantitative first and Judgmental second (checks and balance)
- Edit quantitative numbers based on info gathered (building permits)

- Regression Models
 - Largo does not use because of time and data constraints
 - Regression forecasting of economic data (econometrics)
 - Interesting fact – Beta of a company stock

Step 4 & 5: Select & Implement Forecasting Methods



Step 4 & 5: Select & Implement Forecasting Methods

- There is no “magic bullet” in forecasting (no single technique for all revenue forecasts)
 - This includes forecasting software (Forecast X)
 - Trial and Error
 - Data / Information gathering is the most important (adjusting forecasts)
- Averaging Forecast Methods
 - Some success
 - Time constraints
- Uncertainty
 - Range estimates
 - Scenario Analysis (best, probable and worst case)
 - Instead Largo updates estimates regularly (see monthly report)

Step 4 & 5: Select & Implement Forecasting Methods

- Extrapolation Forecasting (time series forecasting models)
 - Used in Public Sector Forecasting (Largo included)
 - Reliable
 - Objective
 - Inexpensive (Excel)
 - Relatively easy to use and understand (not a lot of statistical expertise)
- Data
 - Availability
 - Observations (many needed)
 - Stability of revenues in most cases (new product revenue forecasts)

Step 4 & 5: Select & Implement Forecasting Methods

- Compare forecasted numbers to actual numbers in models (errors)
- Many methods
 - Mean absolute error (MAE) - accuracy
 - Mean absolute percentage error (MAPE) - accuracy
 - Mean squared error (MSE) - accuracy
 - Root mean squared error (RMSE) - accuracy
 - Mean Error (ME) - bias
 - Mean percentage error (MPE) – bias
- Positive and negative errors
 - Remember accuracy of revenue forecasts in total (earlier slide)

Step 4 & 5: Select & Implement Forecasting Methods

- **Moving Average**
 - Simple / quick
 - Underestimates trend (lags)
 - Conservative in growth phases / Opposite effect in contraction phases
 - Uses limited historical data (variable periods)
 - Largo uses for small revenues without trend – example False Alarms
 - Long term – use the same number as short term estimate
 - Warning – Seasonal data (must de-seasonalize)
- **Weighted Moving Average**
 - The above points apply (not as simple – requires solver or trial and error)
 - Recent data is more important / Should have more of an effect on forecast
 - If the recent period has real strong weight look at models with trend

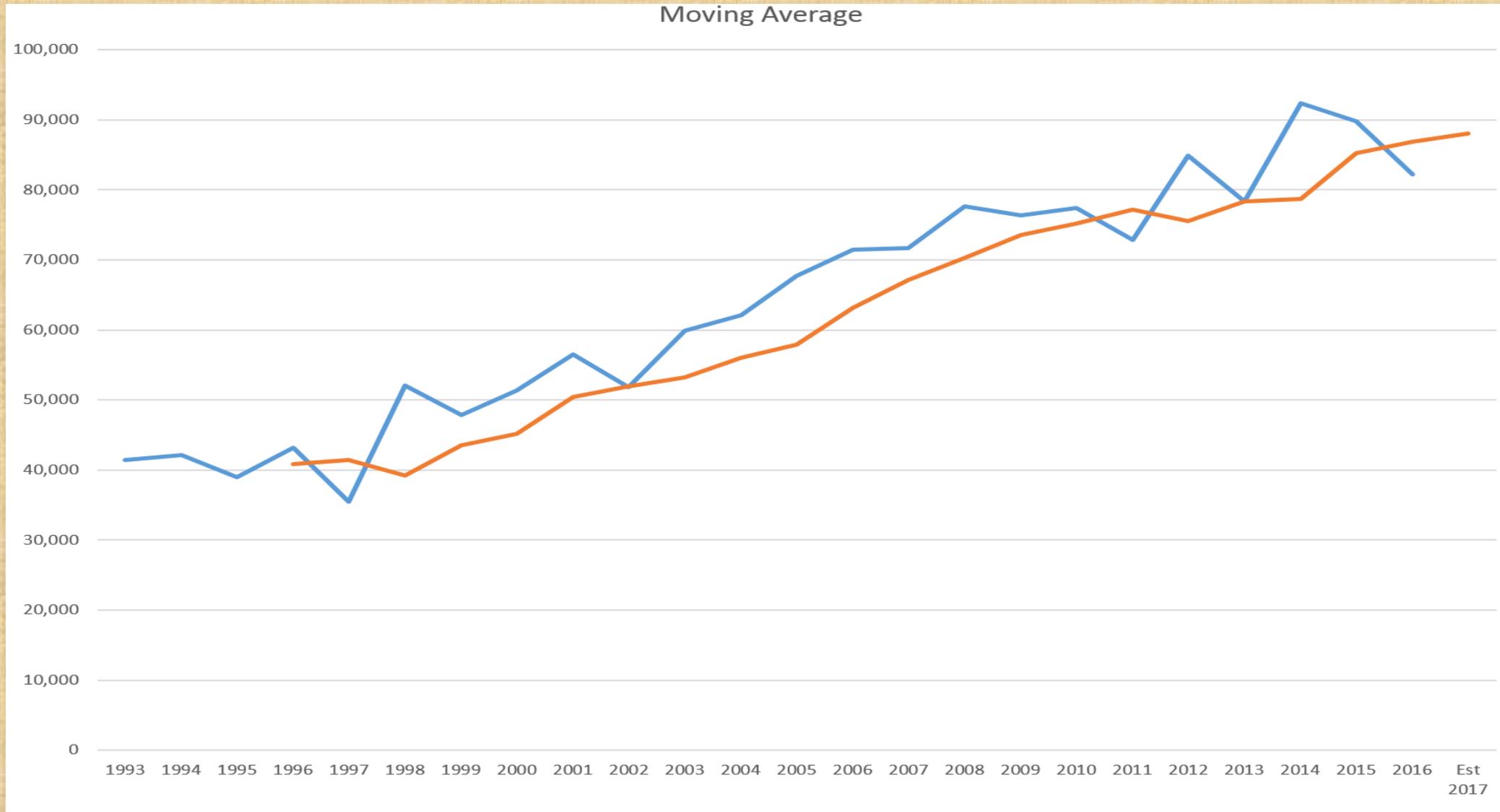
Step 4 & 5: Select & Implement Forecasting Methods

	A	B	C	D	E	F
1	FY	Propane Actuals	MA3 Forecast	Absolute Error	MA4 Forecast	Absolute Error
2	1993	41,451				
3	1994	42,160				
4	1995	39,029				
5	1996	43,176	40,880	2,296		
6	1997	35,435	41,455	6,020	41,454	6,019
7	1998	52,060	39,213	12,847	39,950	12,110
8	1999	47,921	43,557	4,364	42,425	5,496
9	2000	51,316	45,139	6,177	44,648	6,668
10	2001	56,474	50,432	6,042	46,683	9,791
11	2002	51,797	51,904	107	51,943	146
12	2003	59,853	53,196	6,657	51,877	7,976
13	2004	62,069	56,041	6,028	54,860	7,209
14	2005	67,730	57,906	9,824	57,548	10,182
15	2006	71,483	63,217	8,266	60,362	11,121
16	2007	71,648	67,094	4,554	65,284	6,364
17	2008	77,658	70,287	7,371	68,233	9,426
18	2009	76,326	73,596	2,730	72,130	4,196
19	2010	77,445	75,211	2,234	74,279	3,166
20	2011	72,842	77,143	4,301	75,769	2,927
21	2012	84,889	75,538	9,351	76,068	8,821
22	2013	78,344	78,392	48	77,876	469
23	2014	92,362	78,692	13,670	78,380	13,982
24	2015	89,757	85,198	4,559	82,109	7,648
25	2016	82,165	86,821	4,656	86,338	4,173
26	Est 2017		88,095		85,657	
27						
28			SUM =	122,101	Sum =	137,889
29			MAE=	5,814	MAE=	6,894
30						

Step 4 & 5: Select & Implement Forecasting Methods

	A	B	C	D	E	F
1	FY	Propane Actuals	MA3 Forecast	Absolute Error	MA4 Forecast	Absolute Error
2	1993	41451				
3	1994	42160				
4	1995	39029				
5	1996	43176	=AVERAGE(B2:B4)	=ABS(B5-C5)		
6	1997	35435	=AVERAGE(B3:B5)	=ABS(B6-C6)	=AVERAGE(B2:B5)	=ABS(B6-E6)
7	1998	52060	=AVERAGE(B4:B6)	=ABS(B7-C7)	=AVERAGE(B3:B6)	=ABS(B7-E7)
8	1999	47921	=AVERAGE(B5:B7)	=ABS(B8-C8)	=AVERAGE(B4:B7)	=ABS(B8-E8)
9	2000	51316	=AVERAGE(B6:B8)	=ABS(B9-C9)	=AVERAGE(B5:B8)	=ABS(B9-E9)
10	2001	56474	=AVERAGE(B7:B9)	=ABS(B10-C10)	=AVERAGE(B6:B9)	=ABS(B10-E10)
11	2002	51797	=AVERAGE(B8:B10)	=ABS(B11-C11)	=AVERAGE(B7:B10)	=ABS(B11-E11)
12	2003	59853	=AVERAGE(B9:B11)	=ABS(B12-C12)	=AVERAGE(B8:B11)	=ABS(B12-E12)
13	2004	62069	=AVERAGE(B10:B12)	=ABS(B13-C13)	=AVERAGE(B9:B12)	=ABS(B13-E13)
14	2005	67730	=AVERAGE(B11:B13)	=ABS(B14-C14)	=AVERAGE(B10:B13)	=ABS(B14-E14)
15	2006	71483	=AVERAGE(B12:B14)	=ABS(B15-C15)	=AVERAGE(B11:B14)	=ABS(B15-E15)
16	2007	71648	=AVERAGE(B13:B15)	=ABS(B16-C16)	=AVERAGE(B12:B15)	=ABS(B16-E16)
17	2008	77658	=AVERAGE(B14:B16)	=ABS(B17-C17)	=AVERAGE(B13:B16)	=ABS(B17-E17)
18	2009	76326	=AVERAGE(B15:B17)	=ABS(B18-C18)	=AVERAGE(B14:B17)	=ABS(B18-E18)
19	2010	77445	=AVERAGE(B16:B18)	=ABS(B19-C19)	=AVERAGE(B15:B18)	=ABS(B19-E19)
20	2011	72842	=AVERAGE(B17:B19)	=ABS(B20-C20)	=AVERAGE(B16:B19)	=ABS(B20-E20)
21	2012	84889	=AVERAGE(B18:B20)	=ABS(B21-C21)	=AVERAGE(B17:B20)	=ABS(B21-E21)
22	2013	78344	=AVERAGE(B19:B21)	=ABS(B22-C22)	=AVERAGE(B18:B21)	=ABS(B22-E22)
23	2014	92362	=AVERAGE(B20:B22)	=ABS(B23-C23)	=AVERAGE(B19:B22)	=ABS(B23-E23)
24	2015	89757	=AVERAGE(B21:B23)	=ABS(B24-C24)	=AVERAGE(B20:B23)	=ABS(B24-E24)
25	2016	82165	=AVERAGE(B22:B24)	=ABS(B25-C25)	=AVERAGE(B21:B24)	=ABS(B25-E25)
26	Est 2017		=AVERAGE(B23:B25)		=AVERAGE(B22:B25)	
27						
28			SUM =	=SUM(D5:D25)	Sum =	=SUM(F6:F25)
29			MAE =	=AVERAGE(D5:D25)	MAE =	=AVERAGE(F6:F25)
30						
31						

Step 4 & 5: Select & Implement Forecasting Methods



Step 4 & 5: Select & Implement Forecasting Methods

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	A=	0		FY	Propane Actuals	MA3 Forecast	Absolute Error							
2	B=	0.24896		1993	41,451									
3	G=	0.75104		1994	42,160									
4	Sum of Wts	1		1995	39,029									
5				1996	43,176	39,809	3,367							
6				1997	35,435	42,144	6,709							
7				1998	52,060	37,362	14,698							
8				1999	47,921	47,921	0							
9				2000	51,316	48,951	2,365							
10				2001	56,474	50,471	6,003							
11				2002	51,797	55,190	3,393							
12				2003	59,853	52,961	6,892							
13				2004	62,069	57,847	4,222							
14				2005	67,730	61,517	6,213							
15				2006	71,483	66,321	5,162							
16				2007	71,648	70,549	1,099							
17				2008	77,658	71,607	6,051							
18				2009	76,326	76,162	164							
19				2010	77,445	76,658	787							
20				2011	72,842	77,166	4,324							
21				2012	84,889	73,988	10,901							
22				2013	78,344	81,890	3,546							
23				2014	92,362	79,973	12,389							
24				2015	89,757	88,872	885							
25				2016	82,165	90,406	8,241							
26				Est 2017		84,055								
27														
28						SUM =	107,410							
29						MAE=	5,115							
30														

Solver Parameters ✕

Set Objective:

To: Max Min Value Of:

By Changing Variable Cells:

Subject to the Constraints:

\$B\$1 <= \$B\$2
 \$B\$1:\$B\$3 <= 1
 \$B\$1:\$B\$3 >= 0
 \$B\$2 <= \$B\$3
 \$B\$4 = 1

Make Unconstrained Variables Non-Negative

Select a Solving Method:

Solving Method
 Select the GRG Nonlinear engine for Solver Problems that are smooth nonlinear. Select the LP Simplex engine for linear Solver Problems, and select the Evolutionary engine for Solver problems that are non-smooth.

Step 4 & 5: Select & Implement Forecasting Methods

	A	B	C	D	E	F	G
1	A= 0			FY	Propane Actuals	MA3 Forecast	Absolute Error
2	B= 0.248962709154381			1993	41451		
3	G= 0.751037287094568			1994	42160		
4	Sum of Wts	=SUM(B1:B3)		1995	39029		
5				1996	43176	=SUMPRODUCT(\$B\$1:\$B\$3,E2:E4)	=ABS(E5-F5)
6				1997	35435	=SUMPRODUCT(\$B\$1:\$B\$3,E3:E5)	=ABS(E6-F6)
7				1998	52060	=SUMPRODUCT(\$B\$1:\$B\$3,E4:E6)	=ABS(E7-F7)
8				1999	47921	=SUMPRODUCT(\$B\$1:\$B\$3,E5:E7)	=ABS(E8-F8)
9				2000	51316	=SUMPRODUCT(\$B\$1:\$B\$3,E6:E8)	=ABS(E9-F9)
10				2001	56474	=SUMPRODUCT(\$B\$1:\$B\$3,E7:E9)	=ABS(E10-F10)
11				2002	51797	=SUMPRODUCT(\$B\$1:\$B\$3,E8:E10)	=ABS(E11-F11)
12				2003	59853	=SUMPRODUCT(\$B\$1:\$B\$3,E9:E11)	=ABS(E12-F12)
13				2004	62069	=SUMPRODUCT(\$B\$1:\$B\$3,E10:E12)	=ABS(E13-F13)
14				2005	67730	=SUMPRODUCT(\$B\$1:\$B\$3,E11:E13)	=ABS(E14-F14)
15				2006	71483	=SUMPRODUCT(\$B\$1:\$B\$3,E12:E14)	=ABS(E15-F15)
16				2007	71648	=SUMPRODUCT(\$B\$1:\$B\$3,E13:E15)	=ABS(E16-F16)
17				2008	77658	=SUMPRODUCT(\$B\$1:\$B\$3,E14:E16)	=ABS(E17-F17)
18				2009	76326	=SUMPRODUCT(\$B\$1:\$B\$3,E15:E17)	=ABS(E18-F18)
19				2010	77445	=SUMPRODUCT(\$B\$1:\$B\$3,E16:E18)	=ABS(E19-F19)
20				2011	72842	=SUMPRODUCT(\$B\$1:\$B\$3,E17:E19)	=ABS(E20-F20)
21				2012	84889	=SUMPRODUCT(\$B\$1:\$B\$3,E18:E20)	=ABS(E21-F21)
22				2013	78344	=SUMPRODUCT(\$B\$1:\$B\$3,E19:E21)	=ABS(E22-F22)
23				2014	92362	=SUMPRODUCT(\$B\$1:\$B\$3,E20:E22)	=ABS(E23-F23)
24				2015	89757	=SUMPRODUCT(\$B\$1:\$B\$3,E21:E23)	=ABS(E24-F24)
25				2016	82165	=SUMPRODUCT(\$B\$1:\$B\$3,E22:E24)	=ABS(E25-F25)
26				Est 2017		=E25*B3+E24*B2+E23*B1	
27							
28						SUM =	=SUM(G5:G25)
29						MAE=	=AVERAGE(G5:G25)
30							

Step 4 & 5: Select & Implement Forecasting Methods

- Moving Average With Trend
 - Not as simple or quick as Moving Average
 - Adds trend to Moving Average
 - Uses limited historical data (variable periods)
 - Largo uses for small/mid revenues with trend (double check)
 - Long term – use the trend component
 - Warning – The model is using limited observations to forecast the trend
 - Many times I want to look at trend over a greater period
 - Warning – Seasonal data (must de-seasonalize)
 - Forecast= MA level + MA trend x $((L+1)/2)$
 - Why $((L+1)/2)$ L=length of moving average

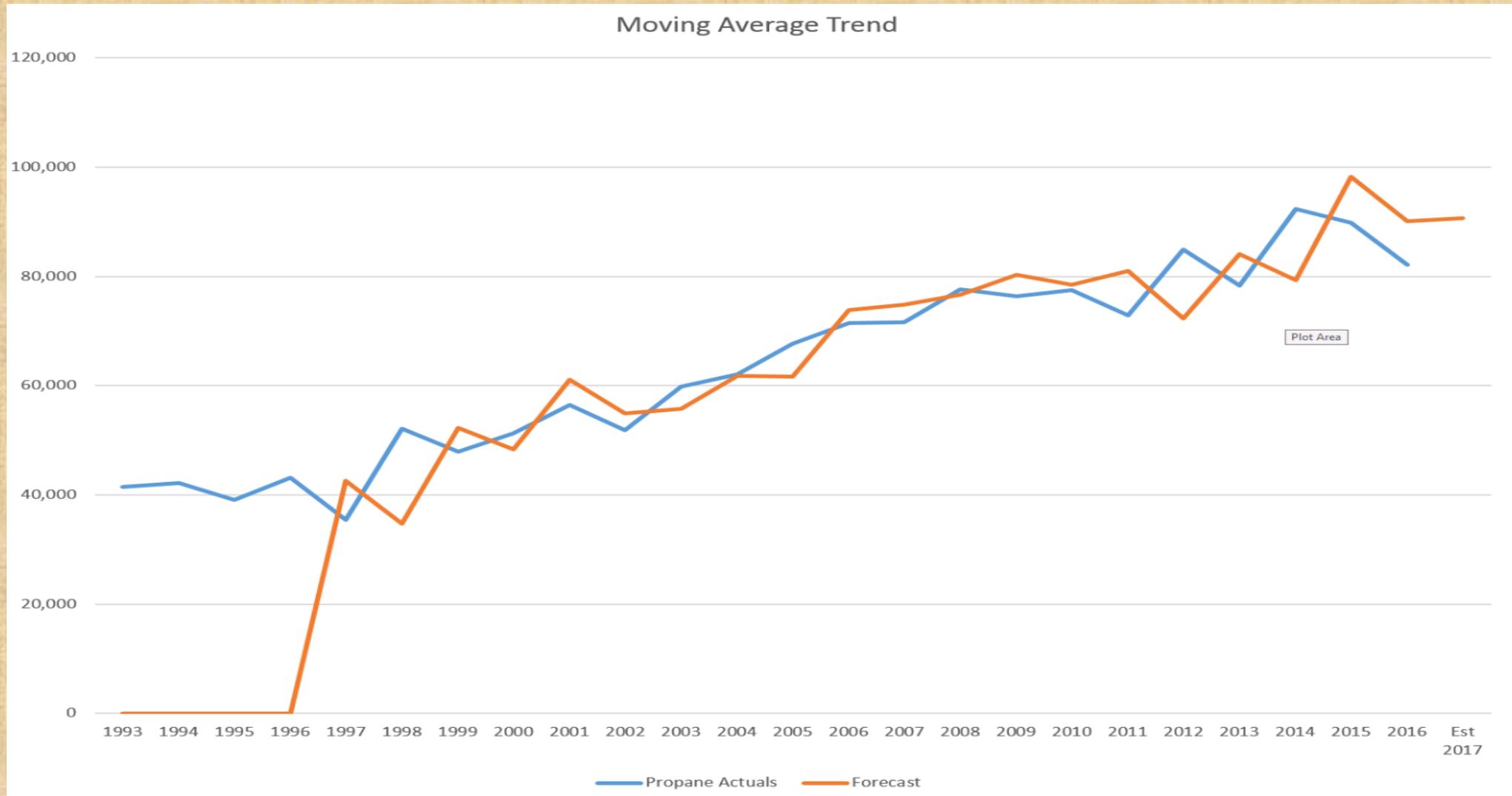
Step 4 & 5: Select & Implement Forecasting Methods

	A	B	C	D	E	F	G
1	FY	Propane Actuals	Trend	MA3 Level	MA3 Trend	Forecast	Absolute Error
2	1993	41,451					
3	1994	42,160	709				
4	1995	39,029	-3,131				
5	1996	43,176	4,147	40,880			
6	1997	35,435	-7,741	41,455	575	42,605	7,170
7	1998	52,060	16,625	39,213	-2,242	34,730	17,330
8	1999	47,921	-4,139	43,557	4,344	52,244	4,323
9	2000	51,316	3,395	45,139	1,582	48,302	3,014
10	2001	56,474	5,158	50,432	5,294	61,020	4,546
11	2002	51,797	-4,677	51,904	1,471	54,846	3,049
12	2003	59,853	8,056	53,196	1,292	55,780	4,073
13	2004	62,069	2,216	56,041	2,846	61,733	336
14	2005	67,730	5,661	57,906	1,865	61,636	6,094
15	2006	71,483	3,753	63,217	5,311	73,839	2,356
16	2007	71,648	165	67,094	3,877	74,847	3,199
17	2008	77,658	6,010	70,287	3,193	76,673	985
18	2009	76,326	-1,332	73,596	3,309	80,215	3,889
19	2010	77,445	1,119	75,211	1,614	78,439	994
20	2011	72,842	-4,603	77,143	1,932	81,008	8,166
21	2012	84,889	12,047	75,538	-1,605	72,327	12,562
22	2013	78,344	-6,545	78,392	2,854	84,101	5,757
23	2014	92,362	14,018	78,692	300	79,291	13,071
24	2015	89,757	-2,605	85,198	6,507	98,212	8,455
25	2016	82,165	-7,592	86,821	1,623	90,066	7,901
26	Est 2017			88,095	1,274	90,642	
27							
28	# of periods (L)	3				SUM =	117,271
29	(L+1)/2	2				MAE =	5,864

Step 4 & 5: Select & Implement Forecasting Methods

	A	B	C	D	E	F	G
1	FY	Propane Actuals	Trend	MA3 Level	MA3 Trend	Forecast	Absolute Error
2	1993	41451					
3	1994	42160	=B3-B2				
4	1995	39029	=B4-B3				
5	1996	43176	=B5-B4	=AVERAGE(B2:B4)			
6	1997	35435	=B6-B5	=AVERAGE(B3:B5)	=AVERAGE(C3:C5)	=D6+E6*\$B\$29	=ABS(B6-F6)
7	1998	52060	=B7-B6	=AVERAGE(B4:B6)	=AVERAGE(C4:C6)	=D7+E7*\$B\$29	=ABS(B7-F7)
8	1999	47921	=B8-B7	=AVERAGE(B5:B7)	=AVERAGE(C5:C7)	=D8+E8*\$B\$29	=ABS(B8-F8)
9	2000	51316	=B9-B8	=AVERAGE(B6:B8)	=AVERAGE(C6:C8)	=D9+E9*\$B\$29	=ABS(B9-F9)
10	2001	56474	=B10-B9	=AVERAGE(B7:B9)	=AVERAGE(C7:C9)	=D10+E10*\$B\$29	=ABS(B10-F10)
11	2002	51797	=B11-B10	=AVERAGE(B8:B10)	=AVERAGE(C8:C10)	=D11+E11*\$B\$29	=ABS(B11-F11)
12	2003	59853	=B12-B11	=AVERAGE(B9:B11)	=AVERAGE(C9:C11)	=D12+E12*\$B\$29	=ABS(B12-F12)
13	2004	62069	=B13-B12	=AVERAGE(B10:B12)	=AVERAGE(C10:C12)	=D13+E13*\$B\$29	=ABS(B13-F13)
14	2005	67730	=B14-B13	=AVERAGE(B11:B13)	=AVERAGE(C11:C13)	=D14+E14*\$B\$29	=ABS(B14-F14)
15	2006	71483	=B15-B14	=AVERAGE(B12:B14)	=AVERAGE(C12:C14)	=D15+E15*\$B\$29	=ABS(B15-F15)
16	2007	71648	=B16-B15	=AVERAGE(B13:B15)	=AVERAGE(C13:C15)	=D16+E16*\$B\$29	=ABS(B16-F16)
17	2008	77658	=B17-B16	=AVERAGE(B14:B16)	=AVERAGE(C14:C16)	=D17+E17*\$B\$29	=ABS(B17-F17)
18	2009	76326	=B18-B17	=AVERAGE(B15:B17)	=AVERAGE(C15:C17)	=D18+E18*\$B\$29	=ABS(B18-F18)
19	2010	77445	=B19-B18	=AVERAGE(B16:B18)	=AVERAGE(C16:C18)	=D19+E19*\$B\$29	=ABS(B19-F19)
20	2011	72842	=B20-B19	=AVERAGE(B17:B19)	=AVERAGE(C17:C19)	=D20+E20*\$B\$29	=ABS(B20-F20)
21	2012	84889	=B21-B20	=AVERAGE(B18:B20)	=AVERAGE(C18:C20)	=D21+E21*\$B\$29	=ABS(B21-F21)
22	2013	78344	=B22-B21	=AVERAGE(B19:B21)	=AVERAGE(C19:C21)	=D22+E22*\$B\$29	=ABS(B22-F22)
23	2014	92362	=B23-B22	=AVERAGE(B20:B22)	=AVERAGE(C20:C22)	=D23+E23*\$B\$29	=ABS(B23-F23)
24	2015	89757	=B24-B23	=AVERAGE(B21:B23)	=AVERAGE(C21:C23)	=D24+E24*\$B\$29	=ABS(B24-F24)
25	2016	82165	=B25-B24	=AVERAGE(B22:B24)	=AVERAGE(C22:C24)	=D25+E25*\$B\$29	=ABS(B25-F25)
26	Est 2017			=AVERAGE(B23:B25)	=AVERAGE(C23:C25)	=D26+E26*\$B\$29	
27							
28	# of periods (L) =	3				SUM =	=SUM(G6:G25)
29	(L+1)/2	=(B28+1)/2				MAE =	=AVERAGE(G6:G25)
30							

Step 4 & 5: Select & Implement Forecasting Methods



Step 4 & 5: Select & Implement Forecasting Methods

- Exponential Smoothing (Exponentially Weighted Moving Average)
 - Not as simple as ANY of the Moving Average models discussed
 - Does not account for trend (lags)
 - Uses ALL historical data / weighting determines influence
 - Greater the Alpha greater the weight assigned to recent observations
 - Greater the Alpha greater the variation from year to year
 - Largo uses for small/mid revenues without trend (double check)
 - Long term – should not use
- Exponential Smoothing models – Largo uses the second one
 - $F = \text{Previous } F + A(\text{previous error})$ *error= actual - forecast
 - $F = \text{Previous Actual} \times A + \text{previous forecast} \times (1-A)$
 - Note, first forecast can be set to equal the first actual
 - Using alpha and the last forecast all forecasts are being stored implicitly

Step 4 & 5: Select & Implement Forecasting Methods

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	A=	0.78672		FY	Propane Actuals	Propane Forecast	Absolute Error									
2				1993	41,451	41,451										
3				1994	42,160	41,451	709									
4				1995	39,029	42,009	2,980									
5				1996	43,176	39,665	3,511									
6				1997	35,435	42,427	6,992									
7				1998	52,060	36,926	15,134									
8				1999	47,921	48,832	911									
9				2000	51,316	48,115	3,201									
10				2001	56,474	50,633	5,841									
11				2002	51,797	55,228	3,431									
12				2003	59,853	52,529	7,324									
13				2004	62,069	58,291	3,778									
14				2005	67,730	61,263	6,467									
15				2006	71,483	66,351	5,132									
16				2007	71,648	70,388	1,260									
17				2008	77,658	71,379	6,279									
18				2009	76,326	76,319	7									
19				2010	77,445	76,324	1,121									
20				2011	72,842	77,206	4,364									
21				2012	84,889	73,773	11,116									
22				2013	78,344	82,518	4,174									
23				2014	92,362	79,234	13,128									
24				2015	89,757	89,562	195									
25				2016	82,165	89,715	7,550									
26				Est 2017		83,775										
27																
28						SUM =	114,605									
29						MAE=	4,983									
30																

X

Solver Parameters

Set Objective:

To: Max Min Value Of:

By Changing Variable Cells:

Subject to the Constraints:

\$B\$1 <= 1

\$B\$1 >= 0

Make Unconstrained Variables Non-Negative

Select a Solving Method:

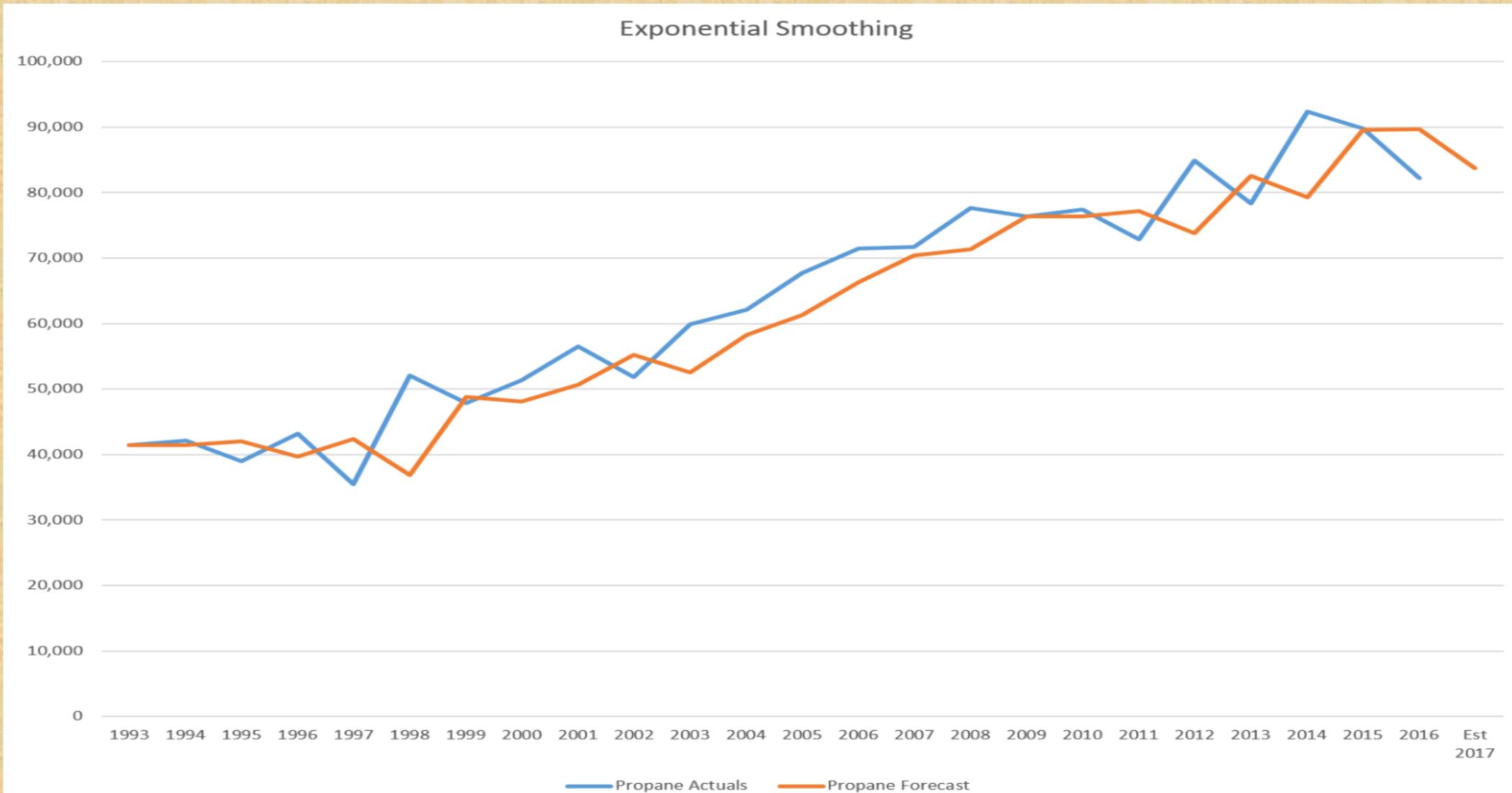
Solving Method

Select the GRG Nonlinear engine for Solver Problems that are smooth nonlinear. Select the LP Simplex engine for linear Solver Problems, and select the Evolutionary engine for Solver problems that are non-smooth.

Step 4 & 5: Select & Implement Forecasting Methods

	A	B	C	D	E	F	G
1	A=	0.78672489058		FY	Propane Actuals	Propane Forecast	Absolute Error
2				1993	41451	=E2	
3				1994	42160	=\$B\$1*E2+(1-\$B\$1)*F2	=ABS(E3-F3)
4				1995	39029	=\$B\$1*E3+(1-\$B\$1)*F3	=ABS(E4-F4)
5				1996	43176	=\$B\$1*E4+(1-\$B\$1)*F4	=ABS(E5-F5)
6				1997	35435	=\$B\$1*E5+(1-\$B\$1)*F5	=ABS(E6-F6)
7				1998	52060	=\$B\$1*E6+(1-\$B\$1)*F6	=ABS(E7-F7)
8				1999	47921	=\$B\$1*E7+(1-\$B\$1)*F7	=ABS(E8-F8)
9				2000	51316	=\$B\$1*E8+(1-\$B\$1)*F8	=ABS(E9-F9)
10				2001	56474	=\$B\$1*E9+(1-\$B\$1)*F9	=ABS(E10-F10)
11				2002	51797	=\$B\$1*E10+(1-\$B\$1)*F10	=ABS(E11-F11)
12				2003	59853	=\$B\$1*E11+(1-\$B\$1)*F11	=ABS(E12-F12)
13				2004	62069	=\$B\$1*E12+(1-\$B\$1)*F12	=ABS(E13-F13)
14				2005	67730	=\$B\$1*E13+(1-\$B\$1)*F13	=ABS(E14-F14)
15				2006	71483	=\$B\$1*E14+(1-\$B\$1)*F14	=ABS(E15-F15)
16				2007	71648	=\$B\$1*E15+(1-\$B\$1)*F15	=ABS(E16-F16)
17				2008	77658	=\$B\$1*E16+(1-\$B\$1)*F16	=ABS(E17-F17)
18				2009	76326	=\$B\$1*E17+(1-\$B\$1)*F17	=ABS(E18-F18)
19				2010	77445	=\$B\$1*E18+(1-\$B\$1)*F18	=ABS(E19-F19)
20				2011	72842	=\$B\$1*E19+(1-\$B\$1)*F19	=ABS(E20-F20)
21				2012	84889	=\$B\$1*E20+(1-\$B\$1)*F20	=ABS(E21-F21)
22				2013	78344	=\$B\$1*E21+(1-\$B\$1)*F21	=ABS(E22-F22)
23				2014	92362	=\$B\$1*E22+(1-\$B\$1)*F22	=ABS(E23-F23)
24				2015	89757	=\$B\$1*E23+(1-\$B\$1)*F23	=ABS(E24-F24)
25				2016	82165	=\$B\$1*E24+(1-\$B\$1)*F24	=ABS(E25-F25)
26				Est 2017		=\$B\$1*E25+(1-\$B\$1)*F25	
27							
28						SUM =	=SUM(G3:G25)
29						MAE =	=AVERAGE(G3:G25)
30							
31							

Step 4 & 5: Select & Implement Forecasting Methods



Step 4 & 5: Select & Implement Forecasting Methods

- Holt Exponential Smoothing
 - Not as simple as ANY of the models discussed
 - Uses exponential smoothing but uses a trend component
 - Uses ALL historical data / two weighting variables determines influence
 - Greater the variable greater the weight assigned to recent observations
 - Greater the variable greater the variation from year to year
 - Alpha is measuring the Level term (base) and Beta is measuring the Trend term
 - If Beta is zero then it would be the exponential smoothing model (no trend)
 - Largo uses Holt for mid/large revenues with trend (favorite model)
 - Long term – Better than exponential smoothing – including trend

Step 4 & 5: Select & Implement Forecasting Methods

- Holt Exponential Smoothing models – Variation from GFOA book
 - Note, first level term equals the first actual (or use average)
 - Note, first term can be set to 0 (or use average)
 - Using variables and the last forecast all forecasts are being stored implicitly
- Damped Trend Exponential Smoothing (never used)
 - Adds third variable that damps trend
 - Belief that trend will fade away

Step 4 & 5: Select & Implement Forecasting Methods

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	A=	0.336018827											
2	B=	0.832825874											
3													
4	FY	Propane Actuals	Level Term	Trend Term	Propane Forecast	ABS % Error							
5	1993	41,451	41,451	0	N/A	N/A							
6	1994	42,160	41,689	198	41,451	1.68%							
7	1995	39,029	40,927	-602	41,888	7.32%							
8	1996	43,176	41,283	196	40,326	6.60%							
9	1997	35,435	39,448	-1,495	41,479	17.06%							
10	1998	52,060	42,693	2,452	37,953	27.10%							
11	1999	47,921	46,078	3,229	45,146	5.79%							
12	2000	51,316	49,982	3,791	49,307	3.91%							
13	2001	56,474	54,681	4,547	53,773	4.78%							
14	2002	51,797	56,731	2,467	59,228	14.35%							
15	2003	59,853	59,418	2,651	59,198	1.09%							
16	2004	62,069	62,069	2,651	62,069	0.00%							
17	2005	67,730	65,731	3,493	64,720	4.44%							
18	2006	71,483	69,983	4,125	69,224	3.16%							
19	2007	71,648	73,282	3,437	74,108	3.43%							
20	2008	77,658	77,034	3,700	76,718	1.21%							
21	2009	76,326	79,253	2,466	80,734	5.77%							
22	2010	77,445	80,283	1,270	81,719	5.52%							
23	2011	72,842	78,626	-1,168	81,553	11.96%							
24	2012	84,889	79,955	912	77,458	8.75%							
25	2013	78,344	80,019	206	80,867	3.22%							
26	2014	92,362	84,303	3,602	80,225	13.14%							
27	2015	89,757	88,528	4,120	87,906	2.06%							
28	2016	82,165	89,126	1,187	92,648	12.76%							
29	Est 2017				90,312								
30						7.18%	MAPE						
31													

Solver Parameters ✕

Set Objective: 📄

To: Max Min Value Of:

By Changing Variable Cells: 📄

Subject to the Constraints:

^

v

Make Unconstrained Variables Non-Negative

Select a Solving Method: Options

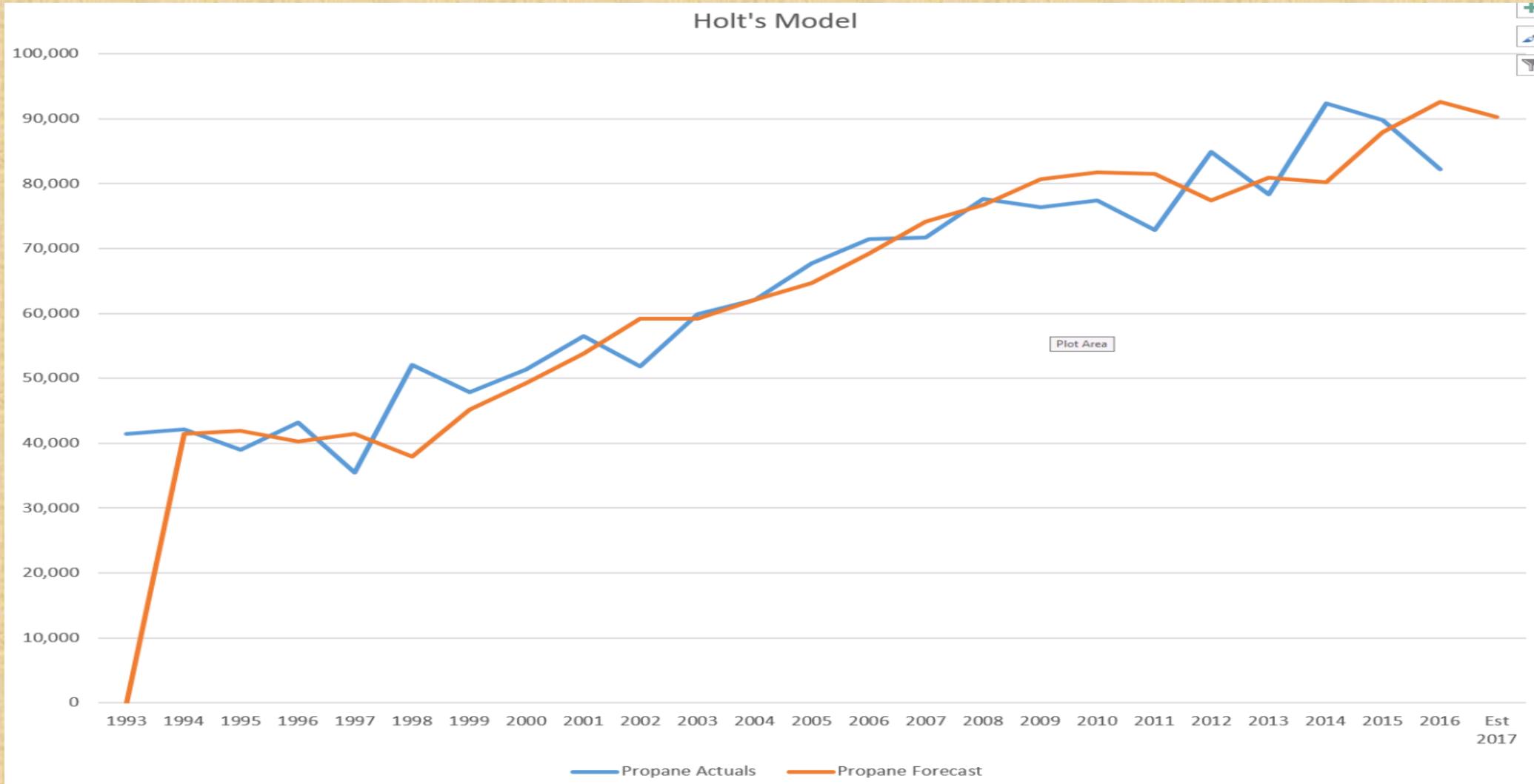
Solving Method

Select the GRG Nonlinear engine for Solver Problems that are smooth nonlinear. Select the LP Simplex engine for linear Solver Problems, and select the Evolutionary engine for Solver problems that are non-smooth.

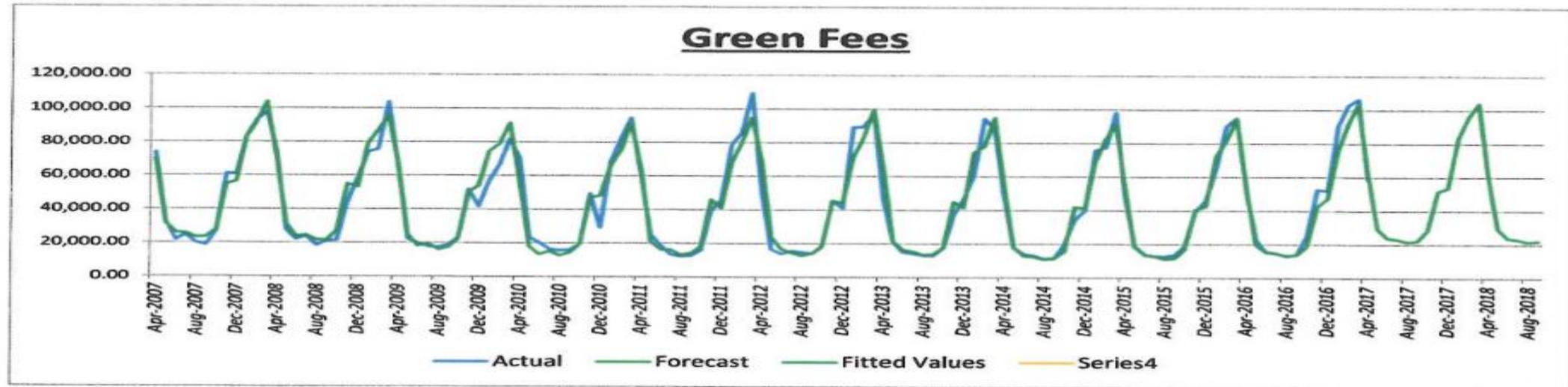
Step 4 & 5: Select & Implement Forecasting Methods

	A	B	C	D	E	F	
1	A=	0.336018827210019					
2	B=	0.832825873936906					
3							
4	FY	Propane Actuals	Level Term	Trend Term	Propane Forecast	ABS % Error	
5	1993	41451	=B5	0	N/A	N/A	
6	1994	42160	= $\$B\$1*B6+(1-\$B\$1)*(C5+D5)$	= $\$B\$2*(C6-C5)+(1-\$B\$2)*D5$	=SUM(C5:D5)	=ABS(B6-E6)/B6	
7	1995	39029	= $\$B\$1*B7+(1-\$B\$1)*(C6+D6)$	= $\$B\$2*(C7-C6)+(1-\$B\$2)*D6$	=SUM(C6:D6)	=ABS(B7-E7)/B7	
8	1996	43176	= $\$B\$1*B8+(1-\$B\$1)*(C7+D7)$	= $\$B\$2*(C8-C7)+(1-\$B\$2)*D7$	=SUM(C7:D7)	=ABS(B8-E8)/B8	
9	1997	35435	= $\$B\$1*B9+(1-\$B\$1)*(C8+D8)$	= $\$B\$2*(C9-C8)+(1-\$B\$2)*D8$	=SUM(C8:D8)	=ABS(B9-E9)/B9	
10	1998	52060	= $\$B\$1*B10+(1-\$B\$1)*(C9+D9)$	= $\$B\$2*(C10-C9)+(1-\$B\$2)*D9$	=SUM(C9:D9)	=ABS(B10-E10)/B10	
11	1999	47921	= $\$B\$1*B11+(1-\$B\$1)*(C10+D10)$	= $\$B\$2*(C11-C10)+(1-\$B\$2)*D10$	=SUM(C10:D10)	=ABS(B11-E11)/B11	
12	2000	51316	= $\$B\$1*B12+(1-\$B\$1)*(C11+D11)$	= $\$B\$2*(C12-C11)+(1-\$B\$2)*D11$	=SUM(C11:D11)	=ABS(B12-E12)/B12	
13	2001	56474	= $\$B\$1*B13+(1-\$B\$1)*(C12+D12)$	= $\$B\$2*(C13-C12)+(1-\$B\$2)*D12$	=SUM(C12:D12)	=ABS(B13-E13)/B13	
14	2002	51797	= $\$B\$1*B14+(1-\$B\$1)*(C13+D13)$	= $\$B\$2*(C14-C13)+(1-\$B\$2)*D13$	=SUM(C13:D13)	=ABS(B14-E14)/B14	
15	2003	59853	= $\$B\$1*B15+(1-\$B\$1)*(C14+D14)$	= $\$B\$2*(C15-C14)+(1-\$B\$2)*D14$	=SUM(C14:D14)	=ABS(B15-E15)/B15	
16	2004	62069	= $\$B\$1*B16+(1-\$B\$1)*(C15+D15)$	= $\$B\$2*(C16-C15)+(1-\$B\$2)*D15$	=SUM(C15:D15)	=ABS(B16-E16)/B16	
17	2005	67730	= $\$B\$1*B17+(1-\$B\$1)*(C16+D16)$	= $\$B\$2*(C17-C16)+(1-\$B\$2)*D16$	=SUM(C16:D16)	=ABS(B17-E17)/B17	
18	2006	71483	= $\$B\$1*B18+(1-\$B\$1)*(C17+D17)$	= $\$B\$2*(C18-C17)+(1-\$B\$2)*D17$	=SUM(C17:D17)	=ABS(B18-E18)/B18	
19	2007	71648	= $\$B\$1*B19+(1-\$B\$1)*(C18+D18)$	= $\$B\$2*(C19-C18)+(1-\$B\$2)*D18$	=SUM(C18:D18)	=ABS(B19-E19)/B19	
20	2008	77658	= $\$B\$1*B20+(1-\$B\$1)*(C19+D19)$	= $\$B\$2*(C20-C19)+(1-\$B\$2)*D19$	=SUM(C19:D19)	=ABS(B20-E20)/B20	
21	2009	76326	= $\$B\$1*B21+(1-\$B\$1)*(C20+D20)$	= $\$B\$2*(C21-C20)+(1-\$B\$2)*D20$	=SUM(C20:D20)	=ABS(B21-E21)/B21	
22	2010	77445	= $\$B\$1*B22+(1-\$B\$1)*(C21+D21)$	= $\$B\$2*(C22-C21)+(1-\$B\$2)*D21$	=SUM(C21:D21)	=ABS(B22-E22)/B22	
23	2011	72842	= $\$B\$1*B23+(1-\$B\$1)*(C22+D22)$	= $\$B\$2*(C23-C22)+(1-\$B\$2)*D22$	=SUM(C22:D22)	=ABS(B23-E23)/B23	
24	2012	84889	= $\$B\$1*B24+(1-\$B\$1)*(C23+D23)$	= $\$B\$2*(C24-C23)+(1-\$B\$2)*D23$	=SUM(C23:D23)	=ABS(B24-E24)/B24	
25	2013	78344	= $\$B\$1*B25+(1-\$B\$1)*(C24+D24)$	= $\$B\$2*(C25-C24)+(1-\$B\$2)*D24$	=SUM(C24:D24)	=ABS(B25-E25)/B25	
26	2014	92362	= $\$B\$1*B26+(1-\$B\$1)*(C25+D25)$	= $\$B\$2*(C26-C25)+(1-\$B\$2)*D25$	=SUM(C25:D25)	=ABS(B26-E26)/B26	
27	2015	89757	= $\$B\$1*B27+(1-\$B\$1)*(C26+D26)$	= $\$B\$2*(C27-C26)+(1-\$B\$2)*D26$	=SUM(C26:D26)	=ABS(B27-E27)/B27	
28	2016	82165	= $\$B\$1*B28+(1-\$B\$1)*(C27+D27)$	= $\$B\$2*(C28-C27)+(1-\$B\$2)*D27$	=SUM(C27:D27)	=ABS(B28-E28)/B28	
29	Est 2017				=SUM(C28:D28)		
30						=AVERAGE(F6:F28)	MAPE

Step 4 & 5: Select & Implement Forecasting Methods



Step 4 & 5: Select & Implement Forecasting Methods



Forecast -- Holt-Winters Selected			
Date	Monthly	Forecast	
		Quarterly	Annual
May-2017	29,285.35		
Jun-2017	23,815.49	53,100.84	
Jul-2017	22,971.34		
Aug-2017	21,537.08	66,548.06	
Sep-2017	22,039.65		
Oct-2017	28,296.09		
Nov-2017	51,669.25		
Dec-2017	53,471.44	133,436.77	253,085.67
Jan-2018	82,976.39		
Feb-2018	95,652.84		
Mar-2018	103,907.01	282,536.24	
Apr-2018	60,869.26		
May-2018	29,285.35		
Jun-2018	23,815.49	113,970.11	
Jul-2018	22,971.34		
Aug-2018	21,537.08		
Sep-2018	22,039.65	66,548.06	
Total	716,140.08		
Avg	42,125.89	119,356.68	253,085.67

Step 4 & 5: Select & Implement Forecasting Methods

Max	103,907.01	282,536.24	253,085.67
Min	21,537.08	53,100.84	253,085.67

Summary Comments			
The forecast has an average error of			11.12%
The data has a standard deviation of			29,527.66
The forecast exceeds the accuracy of a simple average by			95.05%

Audit Trail - Summary Analysis

Audit Trail - Statistics

Accuracy Measures	Value	Forecast Statistics	Value
MAPE	11.12%	Mean	43,047.41
R-Square	95.05%	Standard Deviation	29,527.66
Adjusted R-Square	94.97%		

Method Statistics	Value
Method Selected	Holt Winters
Level	0.18
Seasonal	0.26
Trend	0.00
Decomposition type	Additive

Seasonal Indexes	Value
Index 1	18,603.33
Index 2	-20,596.62
Index 3	-26,398.97
Index 4	-26,060.51
Index 5	-28,309.35
Index 6	-27,542.69
Index 7	-22,433.80
Index 8	4,846.81
Index 9	5,325.69
Index 10	31,152.46
Index 11	39,724.70
Index 12	51,688.97

ForecastX Configuration Parameters

Item	Value
Data range selected	[largo golf.xlsx]Sheet1!\$A\$1:\$B\$122
Time scale for data	Monthly
Periods to forecast	17.00
Seasonal Length	
Replace Outliers Activated	No
Replace Outliers Standard Deviations	

Step 4 & 5: Select & Implement Forecasting Methods

Alpha = 1.00
Beta = 0.49

County Gas Tax 10-335-440

Year	Adj Rev	Level Term	Trend Term	Forecast	Abs % Error	Revenue	Adj Rev-Tot	% Chg	% Adj Chg
2001	960,439	960,439	0			602,993	21,749,071		
2002	964,521	964,521	1,995	960,439	0.4%	605,556	21,841,515	0.43%	0.43%
2003	979,769	979,769	8,471	966,516	1.4%	615,129	22,186,799	1.58%	1.58%
2004	1,019,355	1,019,354	23,676	988,240	3.1%	639,982	23,083,210	4.04%	4.04%
2005	1,059,921	1,059,921	31,931	1,043,031	1.6%	665,451	24,001,839	3.98%	3.98%
2006	1,121,079	1,121,079	46,214	1,091,852	2.6%	703,848	25,386,763	5.77%	5.77%
2007	1,002,049	1,002,051	-34,538	1,167,293	16.5%	629,117	22,691,326	-10.62%	-10.62%
2008	967,508	967,508	-34,540	967,513	0.0%	967,508		53.79%	-3.45%
2009	935,758	935,758	-33,177	932,968	0.3%	935,758		-3.28%	-3.28%
2010	937,772	937,772	-15,980	902,581	3.8%	937,772		0.22%	0.22%
2011	914,715	914,715	-19,438	921,792	0.8%	914,715		-2.46%	-2.46%
2012	928,901	928,901	-3,007	895,278	3.6%	928,901		1.55%	1.55%
2013	947,006	947,006	7,310	925,894	2.2%	947,006		1.95%	1.95%
2014	947,958	947,958	4,203	954,316	0.7%	947,958		0.10%	0.10%
2015	982,612	982,612	19,084	952,161	3.1%	982,612		3.66%	3.66%
2016	1,011,022	1,011,022	23,642	1,001,696	0.9%	1,011,022		2.89%	2.89%
2017				1,034,664			1,035,000		
2018			* see below		1.010	1.000	1,112,900	4.24%	0.42%
2019			* see below		1.010	1.000	1,146,500		
2020					1.015	1.000	1,163,700		
2021					1.015	1.000	1,181,200		
2022					1.015	1.000	1,198,900		
				Growth/Info	Rate Inc	Final Est			
				2.73%					

Data Adjustment:

- * Adj Rev-Tot reflects Total Rev for County (estimated off city revenues)
- * Municipalities went from 25% to 40% per share in FY08 / Largo went to 11.09% to 11.04%
- * Current CGT sunsets 12-31-17 / Largo increase is 90k for new formula (67.5k in FY18 & 22.5k in FY19)

Info to Consider:

- * See state estimate on page 212 (FY17)
- * State Estimate is \$ 23,827,657 / Largo gets \$ 1,052,229
- * State Estimate was \$991,395 for FY16 and it was not close to actual total
- * If gas price decrease (part of elastic demand) gallons should increase
- * Movement for more efficient and environmentally friendly vehicles (against growth)
- * Currently fuel prices are low which might increase consumption (tax per gallon)

Projection:

- * Do not use the State Estimate for this Revenue (not very close last year)

Questions?

(Only Easy Ones!)

Jared Meyer

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