

# Assessing Prior Accuracy:

The science of forecasting improves by subjecting past predictions to the test of their after-the-fact accuracy.

Last year for the first time the BEA provided us with the data to begin assessing this better.

I begin with a second year assessment of this prior to turning to my forecasts.

# Which Averaging Methodology?

*Question 1: Olympic vs. Simple Average Methodology for Combining Forecasts*

*My October 2015 Conclusion: "... additional years of analysis will be required to set a clear winner. However, in a 'moving forward' mentality, Olympic did come closer in three of the five, so I suggest we use that this year."*

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FY15-16	Personal Income	Employment	Inflation	Sales Tax	Income Tax
Actual	4.90%	2.70%	0.70%	6.10%	4.70%
Simple Avg.	4.77%	2.59%	1.98%	4.28%	4.28%
Olympic Avg.	4.84%	2.70%	1.97%	4.27%	4.15%
Winner:	Olympic	Olympic	Olympic (barely)	Simple (barely)	Simple

*My October 2016 Update:* Olympic scoring again came closer in more cases (3 of 5), so evidence is mounting that Olympic scoring is the preferred methodology for combining our forecasts.

# Individual Accuracy vs. Averages

## *Question 2: How Are We Doing Individually & Wisdom of Crowds Logic*

*My October 2015 Conclusion:* "...In terms of my own forecasts, I tended to systematically underestimate employment growth, and systematically overestimate inflation. However, so did all the other members and the BEA. So for now I will keep my previous methodology"

### *Last Year's Results (Presented October 2015):*

<i>Variable</i>	<i>Closest Forecast</i>
Personal Income	Sobel
Employment	Witte (Hefner)
Inflation	Witte (Hefner)
Sales Tax	Sobel
Income Tax	Sobel

# Individual Accuracy vs. Averages

*My October 2016 Update:* Four different closest people for five variables—shows the value in having multiple forecasters. Olympic average is much better than any one person individually. I personally did worse this year, and again underestimated employment growth.

	Personal Income		Employment		Inflation		Sales Tax		Inc. Tax
Brown	5.00%	<u>von Nessen</u>	3.10%	Hefner	2.70%	Actual	6.10%	Brown	5.40%
Hefner	5.00%	Brown	2.80%	Sobel	2.00%	Brown	5.30%	Actual	4.70%
<u>von Nessen</u>	4.90%	Hefner	2.80%	<u>von Nessen</u>	2.00%	<u>Kaglic</u>	4.70%	Hefner	4.60%
Actual	4.90%	Olympic Avg	2.70%	Olympic Avg	1.97%	Hefner	4.50%	Olympic Avg	4.15%
Olympic Avg	4.84%	Actual	2.70%	Brown	1.90%	Olympic Avg	4.27%	<u>von Nessen</u>	3.70%
Sobel	4.63%	<u>Kaglic</u>	2.50%	<u>Kaglic</u>	1.30%	<u>von Nessen</u>	3.60%	Sobel	3.40%
<u>Kaglic</u>	4.30%	Sobel	1.75%	Actual	0.70%	Sobel	3.30%	<u>Kaglic</u>	n/a

Closest Forecast Person

# Summary of Major Economic Forecasts:

## 1. IMF World Economic Outlook (July 2016 Update and April 2016 original)<sup>1</sup>

	<i>World Output Growth</i>	<i>U.S. Real GDP Growth</i>	<i>U.S. Inflation</i>	<i>U.S. Nominal GDP</i>
2016:	3.1%	2.2%	1.0%	3.2%
2017:	3.4%	2.5%	1.4%	3.9%
<i>Long Term (through 2021) only:</i>		2.0%	2.1%	4.1%

Averaging these two gives 1.2% for **FY2016-17**

Long term for **FY2017-18** between 1.4 and 2.1 (so 1.75%)

Averaging these two gives 3.55% for **FY2016-17**, and averaging lower two gives 4.0% for **FY2017-2018**.

# Summary of Major Economic Forecasts:

## 2. Federal Reserve Bank of Philadelphia's Livingston Survey (June 2016)<sup>2</sup>

	<i>U.S. Real GDP Growth Rate</i>	<i>U.S. Nominal GDP Growth Rate</i>	
2016Q2 to 2016Q4:	2.4%	4.3%	} 2016Q3 to 2017Q2 is <b>FY2016-2017</b> , the average of these two is 4.35%
2016Q4 to 2017Q2:	2.1%	4.4%	
Annual 2015 to 2016:	1.8%	3.1%	} <b>FY2017-2018</b> , average 4.35%
Annual 2016 to 2017:	2.3%	4.3%	
Long Term (Next 10 Years):	2.2%	4.4%	
 <i>Unemployment Rate</i>			
	December 2016: 4.7%		
	June 2017: 4.7%		
	Annual 2015 to 2016: 4.9%		
	Annual 2016 to 2017: 4.7%		
 <i>CPI Inflation Rate</i>			
	June 2016 to Dec 2016: 2.0%		} June 2016 to June 2017 is roughly <b>FY2016-2017</b> , the average of these two is 2.05%
	Dec 2016 to June 2017: 2.1%		
	Annual 2015 to 2016: 1.3%		} Looking out into <b>FY2017-2018</b> , inflation average 2.175%
	Annual 2016 to 2017: 2.1%		
	Long Term (Next 10 Years): 2.25%		

# Summary of Major Economic Forecasts:

## 3. Survey of Professional Forecasters (Third Quarter 2016 released August 12, 2016)<sup>3</sup>

	<i>Real GDP%</i>	<i>Nominal GDP%</i>		<i>Unemployment Rate</i>		<i>Employment Growth%</i>
Quarterly data:						
2016:Q3	2.6%	4.2%	} 2016Q3 to 2017Q2 is <b>FY2016-2017</b> , the average of these four is 4.225%, <b>FY2017-18</b> begins 4.5% for 2017Q3	4.8%	} 2016Q3 to 2017Q2 is <b>FY2016-2017</b> , the average of these four is 1.4%, and then 1.3% beginning <b>FY2017-18</b>	1.5%
2016:Q4	2.3%	4.2%		4.7%		1.4%
2017:Q1	2.3%	4.1%		4.7%		1.3%
2017:Q2	2.3%	4.4%		4.6%		1.4%
2017:Q3	2.1%	4.5%		4.6%		1.3%
Annual data (based on annual average levels):						
2016	1.5%	2.8%		4.8%		1.7%
2017	2.3%	4.2%		4.6%		1.3%
2018	2.2%	N.A.		4.6%		N.A.
2019	2.2%	N.A.		4.7%		N.A.

### Probability of Negative Real GDP Growth by Quarter:

2016:Q3	10.6%	} The chance of a negative quarter of GDP growth during FY2016-17 (2016Q3 to 2017Q2) averages 15.93%, and the probability grows as we move toward first quarter of FY2017-18 – <b>HIGHER THAN A YEAR AGO</b>
2016:Q4	15.6%	
2017:Q1	18.5%	
2017:Q2	19.0%	
2017:Q3	21.0%	

# Summary of Major Economic Forecasts:

## 3. Survey of Professional Forecasters (Third Quarter 2016 released August 12, 2016)<sup>3</sup>

### U.S. Inflation Rate (CPI):

#### Quarterly Data

2016:Q3	2.0%
2016:Q4	2.2%
2017:Q1	2.2%
2017:Q2	2.2%
2017:Q3	2.3%

2016Q3 to 2017Q2 is FY2016-2017, the average of these four is 2.15%

#### Q4/Q4 Annual Averages

2016	1.6%
2017	2.3%
2018	2.3%

2017Q3 into 2018 is FY2017-2018S, the average of these two is 2.3%

#### Long-Term Annual Averages

2016-20	2.1%
2016-25	2.15%

## Summary of Forecast Data:

### Economic Estimates:

	FY 2016-2017			FY 2017-2018		
	SC Personal Income Growth (=US Nominal GDP Growth)	CPI Inflation Rate	Employment Growth	SC Personal Income Growth (=US Nominal GDP Growth)	CPI Inflation Rate	Employment Growth
International Monetary Fund	3.55%	1.2%		4.0%	1.75% (1.4-2.1%)	
Livingston Survey	4.35%	2.05%		4.35%	2.175%	
Survey of Professional Forecasters	4.225%	2.15%	1.4%	4.5%	2.3%	1.3%
<i>Average</i>	4.04%	1.80%	1.40%	4.28%	2.08%	1.30%
<i>Median</i>	4.23%	2.05%	1.40%	4.35%	2.18%	1.30%
<b>CHANGES FROM LAST YEAR:</b>						
<i>CHANGE IN AVERAGE</i>	-0.38%	0.10%	-0.35%	-0.39%	+0.01%	-0.30%
<i>CHANGE IN MEDIAN</i>	-0.40%	0.05%	-0.35%	-0.35%	+0.03%	-0.30%

# Summary of Major Economic Forecasts:

## Revenue Estimates:

	FY2015-2016	FY2016-2017
Sales Tax Revenue	3.0%	3.1%
Individual Income Tax Revenue	2.7% (2.6%-2.9%)	3.1%
General Revenue	5.5%	5.6%

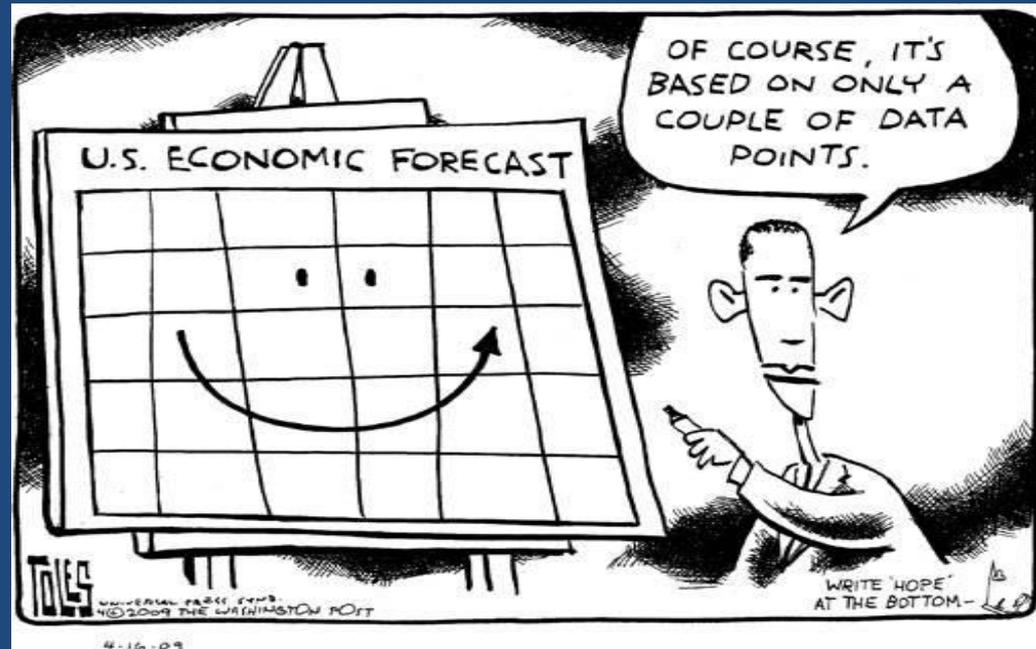
*Using estimated elasticities per Sobel & Holcombe (1996) method.*

# Forecast Table:

What is your forecast growth rate for the following variables:

Variable	Actual FY2015-16	Most Recent 2/	Current 1/ Forecast Rates FY2016-17	Forecast FY2016-17	Forecast FY2017-18
S.C. Personal Income	4.9%	4.2%	4.90%	4.04	4.28
S.C. Employment	2.7%	2.3%	2.0%	1.40	1.30
Inflation Rate (CPI-U)	0.7%	1.1%	< 2.0%	1.80	2.08
Sales Tax (Y-T-D)	6.1%	-5.2%	5.0%	3.0	3.1
Individual Income Tax (Y-T-D)	4.7%	8.1%	4.6%	2.7	3.1

# Caveats:



- (1) Note forecasts are down approximately -0.35 percentage points for growth relative to last year, and odds of a recession are up significantly.
- (2) Given the uncertainty present in the current U.S. and global economy (Brexit, etc.), and the significantly increasing risks of a negative quarter of Real GDP growth, I again ***strongly urge S.C. state government to continue to build sufficient reserves to handle another economic downturn.***
- (3) The above forecasts do not include any impact of October 2016 Hurricane Matthew.