Revenue Forecasting

The law requires it:
- Balanced budget
- Revenue projection
- But just as importantly, it is advisable.

Potential Administrative Process
- Step 1: Revenue Manual
  - Statute and restrictions
  - Rate (current and historical)
  - Collection rates
  - Who pays
  - Economic influences
  - Anything pertinent
Potential Administrative Process
- Step 2: Estimate Major Revenue Sources
  - Property taxes
  - Sales taxes
- Step 3: Departmental Forecasts
  - Utilities
  - Fee driven usually

Potential Administrative Process
- Step 4: Update estimates
  - Refine and adjust

Forecasting Methods
- What kinds of methods are available?
Forecasting Methods

- What kinds of methods are available?
  - Two main ways:
    - Qualitative
    - Quantitative

Qualitative: Expert Judgment

- Aka: Judgmental forecasting

You are the Expert

- Hand out
  - Please see the numbers on the hand out and
  - Draw the point on the graph
  - Estimate the dollar value
  
- In groups of 5 discuss your estimates very briefly
  and come to a consensus on a number
  
- We will come back to these and see how you all did
Qualitative: Expert Judgment

- What factors influenced your forecasts?
- What information would have been helpful to have?

- Did you approach sales taxes and property taxes differently?
- Why or why not?
Property vs Sales Taxes
County Revenue Collections

Qualitative: Consensus

Qualitative
- Strengths
  - Can be low cost
  - Straightforward
  - Not data intensive
- Weaknesses
  - Not transparent
  - Forecaster bias
Quantitative:

Data

- Data is key for quantitative forecasting
- We will use the same data you were just presented with and perform forecasting under different quantitative methods
- Property Tax Revenue: Alamance County

<table>
<thead>
<tr>
<th>Year</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
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<tbody>
<tr>
<td></td>
<td>$48,333</td>
<td>$55,546</td>
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<td>$60,794</td>
<td>$62,223</td>
<td>$63,241</td>
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</tr>
</tbody>
</table>

Quantitative:

Formula Based Projections

\[
P = \left( \frac{\text{Property tax revenue}}{\text{Updated total assessed value}} \times \text{Tax rate} \right) \times \text{Collection rate}
\]

- When to use them:
  - When the revenue source is predictable
  - When the forecaster has access to meaningful data
- For property taxes
  - You know:
    - The size of the tax base
    - The rate
### Quantitative: Trend Analysis

- Simple Moving Averages (SMA)
- Forecast for 2011 with 2007-2010 data

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**Forecast for 2011 with 2007-2010 data:** $61,199

### Quantitative: Trend Analysis

- Simple Moving Averages (SMA)
- Forecast for 2012 with 2008-2011 data

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**Forecast for 2012 with 2008-2011 data:** $62,228

### Quantitative: Trend Analysis

- Simple Moving Averages (SMA)
- Forecast for 2012 with 2005-2011 data

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**Forecast for 2012 with 2005-2011 data:** $58,761
Quantitative: Trend Analysis

Arithmetic Mean Return: Property Tax Revenue

Quantitative: Trend Analysis

Univariate Regression: Property Taxes

Quantitative: Trend Analysis

Strengths and weaknesses

My hobby: Exercising

As you can see, I love exercising. Usually, I stick to my daily routine. I sometimes mix it up when I'm feeling kind.
Quantitative: Causal Modeling

- Strengths and weaknesses
  - Incorporates more economic factors
  - Does not lag behind changes to the economy
  - Requires a great deal of:
    - Data
    - Expertise

Remember

- For all quantitative forecasting...

How to Choose

- Resources
  - Money
  - Staff
  - Data

- Type of revenue being forecasted
- Try multiple methods on previous data
What Worked Best?
Revenue Forecasting Methods

Conclusion
- It can be difficult
- All forecasts are wrong
  - Goal is to minimize how wrong
  - Be cautious...but not too cautious
- Try to keep politics out of forecasting
- Expert judgment should always be incorporated

Thank you.
- Please see more details in Chapter 6 of the text
- Feel free to contact me:
  - afonso@sog.unc.edu