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## Revenue Forecasting

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

An illustration of a golden scale of justice. The left pan is labeled "EXPENDITURES" and the right pan is labeled "REVENUE". The scale is balanced, with both pans at the same level.

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## Potential Administrative Process

- Step 1: Revenue Manual
  - Statute and restrictions
  - Rate (current and historical)
  - Collection rates
  - Who pays
  - Economic influences
  - Anything pertinent

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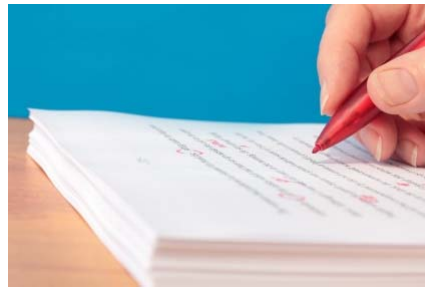
## Potential Administrative Process

- Step 2: Estimate Major Revenue Sources
  - Property taxes
  - Sales taxes
  
- Step 3: Departmental Forecasts
  - Utilities
  - Fee driven usually

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## Potential Administrative Process

- Step 4: Update estimates
  - Refine and adjust



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## Forecasting Methods

- What kinds of methods are available?

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## Forecasting Methods

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

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## Qualitative: Expert Judgment

- Aka: Judgmental forecasting



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## 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

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## Qualitative: Expert Judgment

- What factors influenced your forecasts?

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## Qualitative: Expert Judgment

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

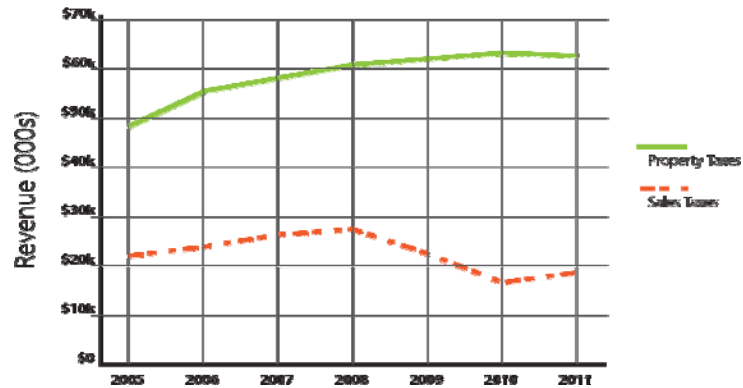
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## Qualitative: Expert Judgment

- 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?

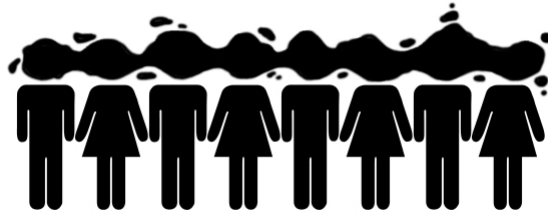
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## Property vs Sales Taxes County Revenue Collections



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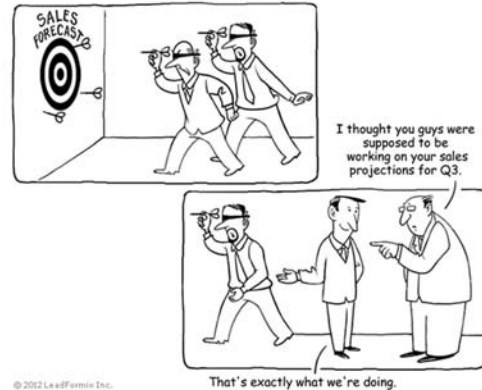
## Qualitative: Consensus



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## Qualitative

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



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## 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

2005	2006	2007	2008	2009	2010	2011
\$48,333	\$55,546	\$58,536	\$60,794	\$62,223	\$63,241	\$62,654



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## Quantitative: Formula Based Projections

$$\text{Property tax revenue} = \left( \left[ \frac{\text{Updated total assessed value}}{100} \right] \times \text{Tax rate} \right) \times \text{Collection rate}$$

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## Quantitative: Formula Based Projections

- 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

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## Quantitative: Trend Analysis

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

2005	2006	2007	2008	2009	2010	2011
\$48,333	\$55,546	\$58,536	\$60,794	\$62,223	\$63,241	\$62,654

**\$61,199**

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## Quantitative: Trend Analysis

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

2005	2006	2007	2008	2009	2010	2011
\$48,333	\$55,546	\$58,536	\$60,794	\$62,223	\$63,241	\$62,654

**\$62,228**

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## Quantitative: Trend Analysis

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

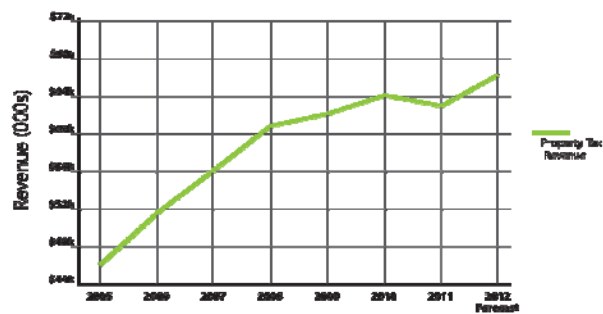
2005	2006	2007	2008	2009	2010	2011
\$48,333	\$55,546	\$58,536	\$60,794	\$62,223	\$63,241	\$62,654

\$58,761

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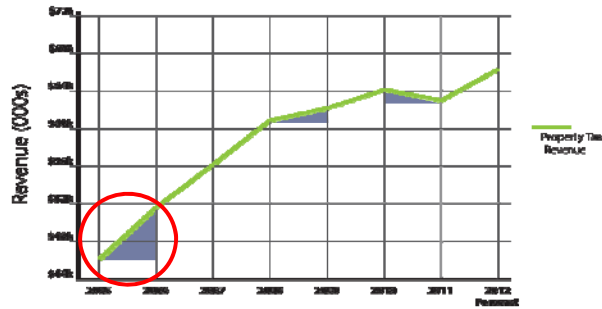
## Quantitative: Trend Analysis

Arithmetic Mean Return: Property Tax Revenue



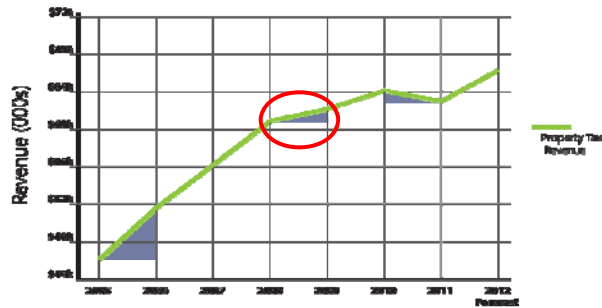
## Quantitative: Trend Analysis

Arithmetic Mean Return: Property Tax Revenue



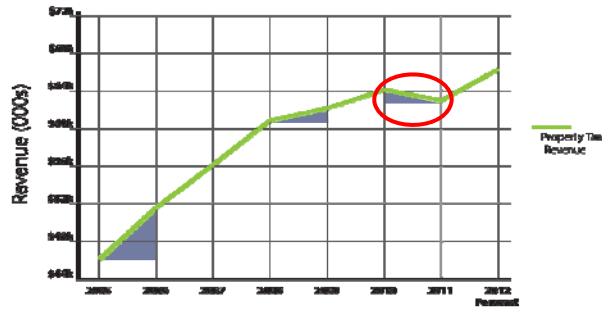
## Quantitative: Trend Analysis

Arithmetic Mean Return: Property Tax Revenue



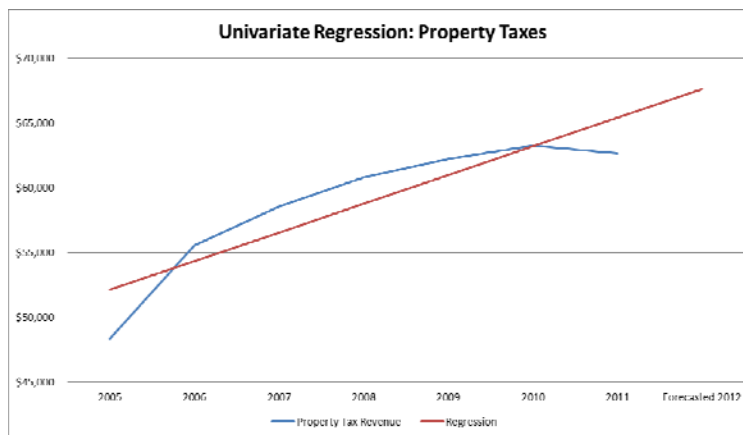
## Quantitative: Trend Analysis

Arithmetic Mean Return: Property Tax Revenue



## Quantitative: Trend Analysis

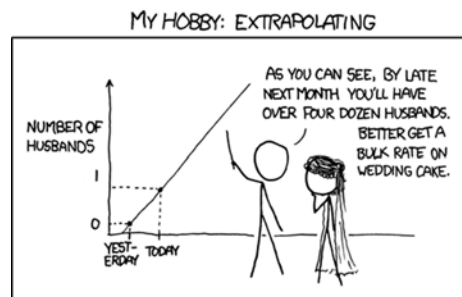
Univariate Regression: Property Taxes



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## Quantitative: Trend Analysis

- Strengths and weaknesses



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## 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



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## Remember

- For all quantitative forecasting...



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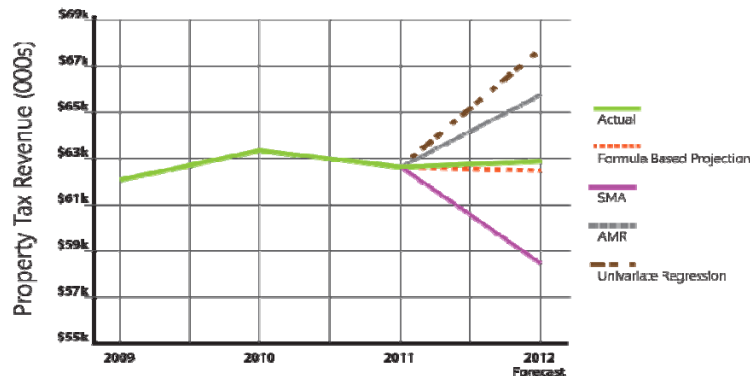
## How to Choose

- Resources
  - Money
  - Staff
  - Data
- Type of revenue being forecasted
- Try multiple methods on previous data

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## What Worked Best?

### Revenue Forecasting Methods



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## 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
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