ECONOMETRIC TECHNIQUES FOR REVENUE FORECASTING USING EVIEWS

Session 6: Revenue Forecasting

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Seasonal adjustment

- Revenue data often exhibits pronounced seasonality.
- Revenue forecasters have to deal with the problem of incorporating monthly and quarterly data with strong seasonality into annual revenue forecasts.
- And with disaggregating annual forecasts into monthly and quarterly to monitor revenue collections.
- There are two ways of dealing with seasonal data when forecasting:
  - Seasonally adjust the data using a program (X11 or X12),
  - Incorporate seasonal dummy variables in the revenue equations.

Seasonal dummy variables

- Seasonal (or monthly) dummy variables take the value of one in specific period and zero elsewhere.
- Can not have dummies for each season and a constant term in a regression or will have perfect multicollinearity.
- Can use constrained dummies.
- Seasonal dummy variables can be used to modify constant of equation or specific coefficients as needed.

Dummy variables

- Dummy variables are very useful in estimating equations for revenue forecasting.
- Can be used to account for shifts in the equations such as unquantified changes in tax rates or bases.
- Can also be used to account for unusual observations resulting from known or unknown causes.

Forecasting Techniques

- EViews provides a whole kit of forecasting tools from the simplest to the most advanced.
  - Extrapolation, smoothing, Hodrick-Prescott filter
  - Time series analysis
  - Estimated structural equation
- Can be used to build a revenue forecasting model and to produce forecasts.
- Can also be used to analyze the source of forecast errors and evaluate changes in the forecast.

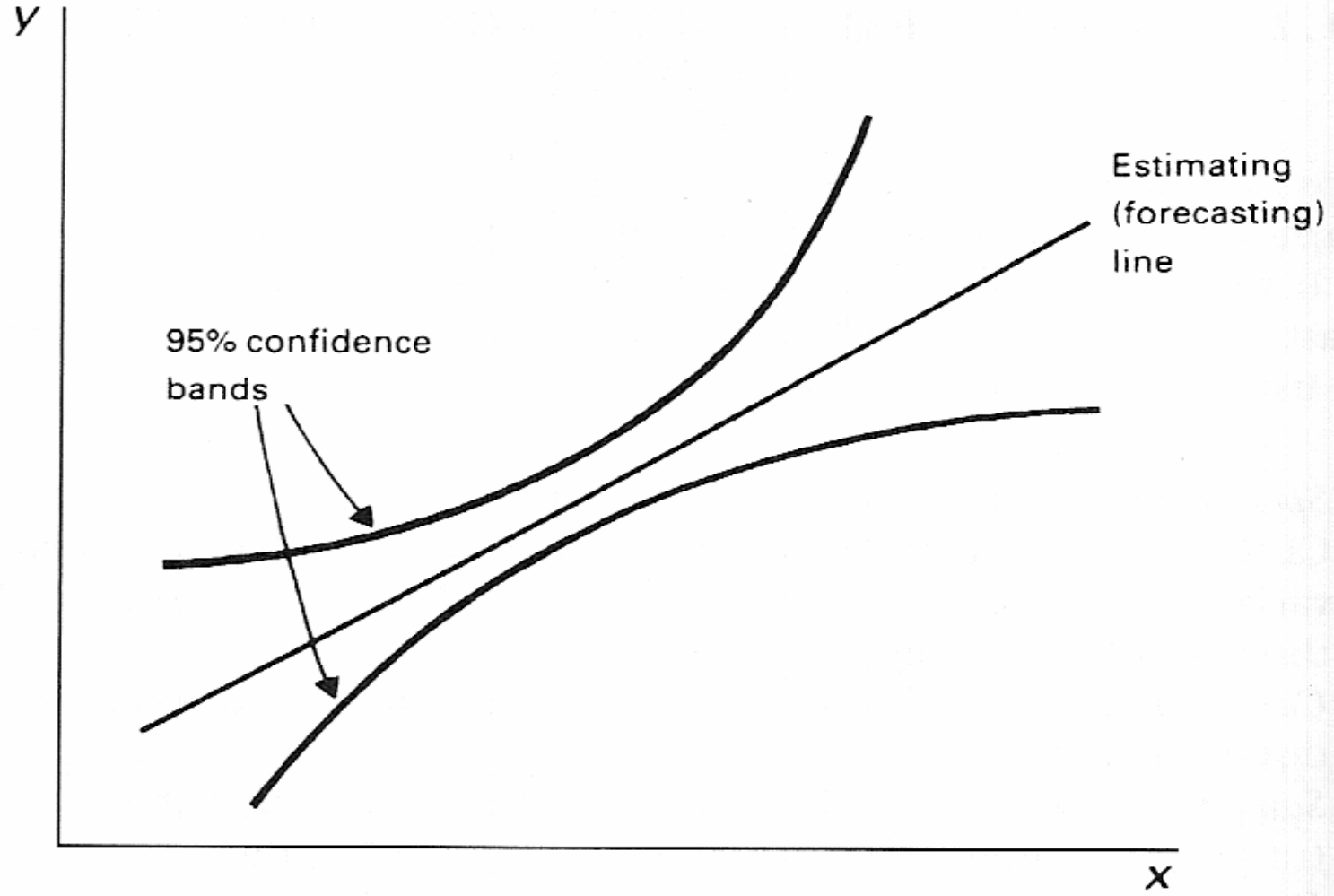

Figure 19.1 Confidence intervals for forecasting

Source: Peter Kennedy, *A Guide to Econometrics* (2003).

Evaluating Forecast Errors

- Sources
  - Errors in Specification
  - Errors in forecasting independent variables
  - Errors in coefficients from sampling
  - Random errors (disturbance term)
- Measuring errors
  - Mean absolute error
  - Root mean square error
  - Mean absolute percentage error
  - Correlation of forecast and actual values
- Decomposing errors
  - Thiel’s Inequality coefficient

Wrap-up on Revenue Forecasting with EViews

- EViews is a powerful tool for revenue forecasting once you master it.
- Allows mixed frequency database required for forecasting and monitoring revenues.
- Contains all the statistical techniques necessary to estimate rate-times-base equations required for revenue forecasting.
- Has modeling capability to build and maintain revenue forecasting models.
- Facilitates analysis of changes in the forecast and evaluation of forecasting errors.

Proposed Next Steps

- A data base of fiscal and economic data has been created in EViews format.
- Ministry staff has now acquired the skill to use EViews to develop revenue forecasting equations.
- Also has the detailed institutional knowledge of tax system to specify appropriate equations for the different revenue sources.
- Equations can now be estimated for each of them.
- The equations can easily be put together into a model and used to prepare the medium-term fiscal forecast for next year's budget.
- The model can also be used to monitor the revenue forecast over time as new data becomes available and to update the forecast if necessary.