Estimating Future Values of Source Data

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Background

• BEA estimates are backward looking; previous month, quarter, etc.

• Source data: Survey and Non-survey (administrative, private proprietary)

• About 80% of the source data comes from external sources

• Source data received over time

• As a result, BEA produces vintages of estimates
  o Example: 3 current quarter estimates of GDP: 30 (Advance), 60 (Second) and 90 (Third) days after end of reference quarter
GDP (expenditure approach) =

Personal Consumption Expenditures + Gross Private Domestic Investment +
Government Consumption and Investment + Exports – Imports

- Each component above has many subcomponents
- Example: Personal Consumption Expenditures has 200+ subcomponents
- Vintage estimates for each subcomponent; aggregated to produce vintage estimate of GDP
• Component $i$ estimated in time $t$ by either:
  o Method 1: Relevant data from source data provider
  o Method 2: Extrapolation/otherwise “forecasted”

  Classification of data provided

• Share of Method in GDP estimates
  o Advance: $\approx 25\%$ Method 1; $\approx 75\%$ Method 2
  o Third: $\approx 38\%$ Method 1; $\approx 62\%$ Method 2
Examination of Method 2

• Includes: Extrapolation, moving averages, regressions, growth factors and judgement

• Each program determines the best method for their estimates

• Consider PCE Services
  o Due to limited source data, many PCE Services estimates use trends for extrapolation for the first three estimates
  o Two common trend methods in PCE Services use the US population and the price index specific to that category
  o One method uses this simple population trend to extrapolate, but some categories also apply a growth rate.
PCE Services Trend Method

• Trend method 1: \( C_D_t = C_D_{t-1} \left( \frac{USP}{USP_{t-1}} \right) \left( \frac{PI}{PI_{t-1}} \right) \)

• Trend method 2: \( C_D_t = C_D_{t-1} \left( \frac{USP}{USP_{t-1}} \right) \left( \frac{PI}{PI_{t-1}} \right) (g) \)

• Where:
  
  o CD - Current-Dollar Services estimate
  o USP - Projections of total US population from the Census Bureau
  o PI - Price index for the estimate category based on BLS data.
  o g - Growth rate determined by analysts and supervisors using the growth in the annual estimate for recent years. Growth rates are updated during Annual Updates.
• Regional program estimates largely based on income variables.

• IRS/SOI data on income taxes are extrapolated forward a year by using the change in the BLS Quarterly Census of Employment and Wages (QCEW) wage data for the extrapolated year.

• BLS QCEW State quarterly wages are extrapolated forward a quarter by using the change in Current Employment Survey state level employment.
Evaluation of Estimation

• Estimation is comprised of survey and non-survey data.
• We do not know “true” value.
• Reliability: evaluation of the repeated estimation of the same event
• Assessed by examining magnitude and pattern of revisions.
Evaluating Revisions

- Evaluate the magnitudes of difference between two vintages

\[ R_t = Y_t - Y_{t-1} \]

- Qualitative reliability: whether estimates present the same general picture of economic activity in terms of the following:
  - Long-term growth rates
  - Trends in saving, investment, government spending, corporate profits, and other key components of GDP and GDI
  - Broad features of the business cycle
  - The patterns of quarterly growth, including whether growth in any period is high or low relative to the trend, is accelerating or decelerating, or is positive or negative.

- “See The Revisions to Gross Domestic Product, Gross Domestic Income, and Their Major Components” (Fixler, de Francisco & Kanal, 2021)
Revision: Difference between Latest and Third Estimates


Percent growth

U.S. Bureau of Economic Analysis
Reducing Revision Magnitudes

• Earlier vintage estimate can be viewed as depending on the “forecasted” value conditioned on the information available at the time

• Note that the previous estimate may not be identical to the forecasted value as there are adjustments

• Implication is that revision magnitudes can be decomposed into three main sources:
  o forecast error*
  o new source data
  o revisions to previously received source data

• Efforts to reduce forecast error
  o Researching the use of nowcasting techniques; Chen and Hood https://www.bea.gov/system/files/papers/BEA-WP2021-3.pdf

* Falls within the direct control of the BEA and its production staff.
Thank you for your time, questions?