Seasonal Adjustment and BEA’s Estimates of GDP and GDI

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The recent contraction...

Percent change in real GDP and GDI (SAAR)
...has complicated seasonal adjustment

- Standard seasonal adjustment methods can interpret the sharp contraction in 2008:Q4 and 2009:Q1 as a change in seasonal patterns.

- Standard seasonal adjustment methods reduce but do not eliminate the effect of extreme events.

- If this contraction has an “excessive” effect on seasonal adjustment, seasonally adjusted data in later years may be
  - unrealistically strong in Q4 and Q1
  - unrealistically weak in Q2 and Q3
Perspectives on seasonal adjustment

- Several analysts have expressed concerns about excessive “drift” of seasonal factors in economic data
  - Nomura, FT/Alphaville, Goldman Sachs, others

- Federal Reserve Industrial Production Index, 2010 Annual Revision
  - Held seasonal factors constant over recession trough
  - Some series pre-adjusted to remove the recession pattern before applying Census X-12 procedure

- The “correct” way to weight 2008Q4 and 2009Q1 in seasonal adjustment is unclear
  - No one observes the “true” seasonal factors
Seasonal adjustment, why do it?

▪ Remove seasonal effects from a time series
  ▪ Seasonal effects are thought to have roughly the same time, intensity, direction each year

▪ To better view underlying movements
  ▪ Cycles and trends
  ▪ Identify direction and turning points

▪ Without adjusting for seasonality
  ▪ May be too difficult to view significance of movements
Seasonal adjustment and extreme events

- BEA’s estimates are based on seasonal factors that are revised over time, allowing for shifts in seasonal patterns.
  - Many are revised annually, using an additional year of data
  - Others are revised each period, using concurrent seasonal factors
  - Revisions to seasonal factors occur over time; even if there are no revisions to the underlying unadjusted data

- Revisions to seasonal factors may be unusually large after an extreme event

- The effect of an extreme event on seasonal factors declines over time
  - Census X-12 gives more weight to most recent years
Measuring the effect of changes in seasonal factors on trends in GDP and GDI is not straightforward

- BEA prepares seasonally adjusted estimates of detailed components and then aggregates
- BEA does not aggregate seasonally unadjusted data and then apply seasonal adjustment to aggregates

BEA’s estimates of detailed components of GDP and GDI rely mostly on source data that are seasonally adjusted by the Census Bureau and by BLS
BEA’s estimation process does not require the estimation of seasonally unadjusted GDP and GDI
- In the past, BEA prepared seasonally unadjusted estimates of GDP
- BEA discontinued publication of seasonally unadjusted GDP in response to budget cuts
- Seasonal factors for GDP, GDI are not readily available

Past research shows that revisions to seasonal adjustment factors can play an important role in revisions to GDP
- Fixler and Grimm (December 2003 Survey of Current Business)

Seasonal adjustment revisions played a noticeable role in the 2011 AR
- New seasonal adjustment procedure for imports of petroleum: BEA now directly seasonally adjusts quantities
Seasonal adjustment in GDP/GDI (cont’d)

- Seasonal adjustment problems with any one data source may have only a limited effect on seasonally adjusted GDP
  - Retail sales makes up about 31 percent of PCE and 22 percent of GDP

- Seasonal adjustment for wages and salaries
  - Even minor revisions to seasonal factors may appear large in dollars

- What is the alternative to standard seasonal adjustment?
  - Remove the effect of 2008Q4 and 2009Q1?
  - Less frequent vs more frequent updates?
  - Different seasonal adjustment procedures?
Seasonal adjustment: PCE for goods

- Major data source: seasonally adjusted monthly retail sales (MRTS), Census Bureau
  - Industry sales converted to commodity sales using input-output relationships

- Motor vehicle units: Federal Reserve seasonal factors

- CPIs: seasonally adjusted by BLS

- BEA seasonally adjusts some data, including
  - Motor vehicle registration and price data (private sources)
  - Gasoline (EIA)
  - Prescription drugs (IMS Health)
Seasonal adjustment: PCE for services

- **Major data source:** quarterly services survey (QSS), Census Bureau
  - Limited history for seasonal adjustment
  - For the 2012 annual revision. BEA will move to seasonal adjustment using 4 qtr-moving average

- **CPIs:** seasonally adjusted by BLS

- **BEA seasonally adjusts some series, including**
  - PPIs and IPIs (BLS)
  - Electricity and natural gas (EIA)
  - Air transportation (Airlines 4 America)
  - Hotel services (Smith Travel Research)
  - Financial services (FDIC, other gov’t agencies, Investment Company Institute)
  - Gambling (state agencies)
Investment, Structures

- Major data source: seasonally adjusted monthly construction spending, value put-in-place (VPIP), Census Bureau

- Petroleum and natural gas structures: data from American Petroleum Institute and Department of Energy, not seasonally adjusted

- Seasonally adjusted price index for homes: Census Bureau

- BEA seasonally adjusts PPIs, other price indexes
Investment, Equipment and Software

- Major data source: seasonally adjusted monthly survey of manufacturers’ shipments, inventories, and orders (M3) Census Bureau

- Software: Seasonally adjusted QSS data, Census

- BEA seasonally adjusts PPIs, motor vehicle data, some imports and exports
Inventory Investment

- Manufacturing, merchant wholesale, and retail, current dollars: seasonally adjusted data from Census Bureau monthly surveys
  - M3, MRTS, monthly wholesale trade surveys (MWTS)

- Construction: seasonally adjusted VPIP less improvements, Census Bureau

- Mining: quarterly financial reports (QFR), Census Bureau, not seasonally adjusted

- BEA seasonally adjusts
  - PPIs, IPIs, from BLS
  - prices and quantities from EIA, for coal and gas utilities
Exports and Imports

- Major data source, goods: seasonally adjusted monthly estimates, based primarily on Census Bureau data on trade in goods.

- Major data source, services: International Transactions Accounts (ITAs) -- BEA surveys and data reported by other U.S. government agencies, seasonally adjusted by BEA

- BEA seasonally adjusts IPIs, PPIs, export prices
Compensation: employment data seasonally adjusted by BLS

Investment in structures: VPIP data, seasonally adjusted, Census Bureau

Other government consumption expenditures and gross investment: BEA seasonally adjusts data from government agencies when necessary

BEA seasonally adjusts PPIs, some other price indexes
Seasonal adjustment: GDI

- **Wages and salaries**
  - Current Employment Statistics: seasonally adjusted by BLS
  - Quarterly Census of Employment and Wages: seasonally adjusted by BEA

- **Corporate profits:**
  - BEA seasonally adjusts profits data from QFR, other sources

- **Nonfarm proprietors income:** mainly indicators seasonally adjusted from BLS, Census Bureau
Future work

▪ **BEA’s 2012 annual revision and 2013 comprehensive revision will incorporate revisions to seasonal factors**
  ▪ BEA staff will carefully examine changes/revisions in seasonal factors

▪ **BEA will collaborate with source data agencies**
  ▪ Census Bureau, BLS

▪ **Suggestions?**