Compiling SUTs in volume terms

Workshop on Supply and Use Tables
2-4 October 2018
Chisinau, Moldova
Agenda

- Introduction
- The recommended compilation approach
- Types of deflators
- In Practice
National accounts provide comprehensive and coherent data which can be used for analysing and evaluating the performance of an economy, and serving as inputs for formulating economic policy.

The national accounts are normally laid out in “nominal” terms in the currency of the country; however, because prices are constantly in flux, the dollar (for example) is an elastic ruler, representing different amounts of purchasing power at different points in time.

To address this fact, the national accounts also provide decompositions of some value series into distinct price and volume components.

The volume and price decomposition accounts are a vital component of the macroeconomic accounts because they “pull aside the veil of money” to reveal underlying changes in the real economy. They also provide a picture of relative price change by product category, and measures of aggregate price inflation.
Contrary to data in current prices, much of the data in volume terms cannot be directly observed.

By applying an appropriate combination of price and volume index formulae, SUTs in volume terms may be modelled from the SUTs in current prices.

This is done using the “double deflation” approach, the recommended UN SNA approach to estimating gross value added (GVA) by industry in volume terms.

Deflation is a technique applied to remove price impact from a nominal aggregate value by using a price index.

When this is done, all the identities and relationships of nominal SUTs are maintained in the SUTs in volume terms, both at basic prices and at purchasers’ prices:

- $\Sigma$Output sum = $\Sigma$Input
- Product Supply = Product Use
- GDP-Production = GDP-Income = GDP-Expenditure
Procedural approach to deflating SUTs
The H-approach

- **Step 1:** Starting from the current price SUTs at purchasers’ prices, derive current price SUTs at basic prices. Split the Use Table at basic prices between uses of imported goods and services (Imports Use Table) and uses of domestically produced goods and services (Domestic Use Table).
The H-approach

- Step 2: Deflate the Domestic and Imports
  Use Tables at basic prices using appropriate deflators. Deflate the valuation matrices for taxes, subsidies and margins.
The H-approach

- Step 3: Analyze the volume changes implied by the deflated SUTs, and make adjustments if necessary.
- Step 4: Compile SUTs at purchasers’ prices in previous years’ prices by adding the SUTs at basic prices and the valuation matrices obtained in the previous steps.
- Step 5: Adjust current price SUTs if necessary.
Types of deflators
The price and volume indicators have to meet a number of requirements in order to be appropriate for estimating price and volume indices within the SUTs framework:

- A low level of aggregation of products is preferred
- Relate directly to the aggregate being measured e.g. output at basic prices
- Sufficient stratification (prices for all product groups making up the aggregate)
- Sufficient and detailed matching
- Sufficiently representative for the product group (when sampling products)
- Sufficiently specific to user if necessary e.g. exports vs domestic use
### Output table

- Producers’ price indices (PPI)
- Price indicators other than direct observation for some products may have to be considered, for example:
  - Unit value indices
  - Consumer price indices
  - Extrapolation by volume indexes
  - Tariff indices
  - Input methods for non-market production

### Imports table

- Import price indices
- Unit value indices
- Limited availability of import price data covering services, so proxies needed (e.g. domestic deflators)
Types of deflators

Use table at basic prices

- Domestic use table
  - PPI

- Imports use table
  - Import price indices

GVA by industry

- Not deflated directly
- Double deflation approach:
  - GVA in volume terms =
    - + Deflated output
    - - Deflated intermediate inputs

- Compensation of employees
  - Labour or Wage Cost Index

- Other taxes and subsidies on production
  - Quantity indicators e.g. building stock / pollution emitted
The value of a commodity assessed in constant purchaser prices reflects what the purchaser would effectively pay if base-year prices were in effect.

This would include the costs of trade, transport, storage and tax margins that are a wedge between what the purchaser paid and what the producer received.

Methods to observe price and volume indices based on direct price and quantity indicators are rarely available.
### Types of deflators - Valuation matrices

- **Trade margins**
  - A margin rate is applied to the value of the product in volume terms
  - \( TR_{t,t-1} = TR_{t-1,t-1} \times KB_t \)

- **Transport margins**
  - Similar to trade margins; OR
  - Using price indices of transport industries (requires a product x mode of transport matrix)

- **Taxes / subsidies on products**
  - Constant price taxes / subsidies can be calculated as the base-year rate, applied to the constant price value at basic prices
  - \( T_{t,t-1} = T_{t-1,t-1} \times KB_t \)
Types of deflators – Use table at purchasers’ prices

- The Use Table at purchasers’ prices can be derived from the Use Table at basic prices and the valuation matrices.
- Alternative approaches may be used using indicators appropriate for this valuation. These approaches may also be used to further check and validate the results obtained from the recommended approach.
- Intermediate consumption:
  - Intermediate consumption price indices (ICPIs) if available
  - CPI where appropriate (e.g. fuel use)
- Exports
  - Export price indices
  - Unit value indices
  - PPI for services
- Household final consumption expenditure
  - CPI
In Practice

Countries typically implement something close to the H-approach described earlier in the presentation

1. Derive current price SUTs at basic prices from current price SUTs at purchasers’ prices
2. Deflate the current price SUTs at basic prices using appropriate deflators. Deflate the valuation matrices for taxes, subsidies and margins by applying the previous year rates to the volumes at basic prices.
3. Analyze the deflated SUTs, and make adjustments if necessary
   - Rates of growth of Gross Output and Value added; Implicit price
   - Stability of Input-Output ratios over time
   - Effect on ratios after chaining to a reference year
   - Validate, examine and confront deflators and volume estimates
   - Compare with published estimates e.g. Monthly GDP by industry; Quarterly GDP expenditure
4. Compile SUTs at purchasers’ prices in previous years’ prices by adding the SUTs at basic prices and the valuation matrices obtained in the previous steps.
5. Adjust current price SUTs if necessary.
Countries can and do adopt variations to the H- Approach based on historical compilation practices, resources, data gaps etc.

For Example:
- Sometime the Import or Domestic Use Table are not created. Rather, intermediate inputs and other final uses might be deflated using the net supply \([\text{Output} + \text{Imports} - \text{Exports} - \text{M&E}]\) implicit price indexes.
### Types of product deflators used in the Canadian SUTs

**Legend:**
- IPPI=Industrial Product Price Index
- FPI=Farm Input Price Index
- SPPI=Service Producer Price Index
- AWE=Average Weekly Earnings
- CPI= Consumer Price Index
- NHPI=New Housing Price Index
- API=Apartment Price Index
- NRBMPI - Non-residential Building Material Price Index
- GFCF= Gross Fixed Capital Formation
- HHFCe= Gross Domestic Fixed Capital Formation
- GFCe= Gross Domestic Fixed Capital
- ITD Imports= Import Prices HS10 level, Unit values and IPPI
- MEPI/IPI = M&E Price Index for M&E products; Net supply IPI for inventories
- TASPI= Traveller Accommodation Service Price Index
- NEAD Input Cost= Weighted average of inputs and index of AWE
- IPPI= Implicit prices indices

#### Goods
- Agriculture products
- Forest products
- Fish
- Oil and gas
- Minerals
- Manufactured goods

#### Services
- Agriculture services
- Forestry services
- Mining and quarrying services
- Residential Construction
- Non-Residential Construction
- Utilities
- Manufacturing services
- Wholesaling services
- Retail services
- Transportation services
- Motion picture, broadcasting services
- Print publishing products
- Telecommunications services
- Internet, computer related services
- Finance and insurance services
- Real estate services
- Professional and technical services
- Administrative and support services
- Waste management services
- Education services
- Health care services
- Social assistance services
- Arts, entertainment and recreation services
- Accommodation services
- Meal and beverage services
- Repair and maintenance services
- Personal services
- Public administration services

### Mathematical Formulation

\[
\text{Supply} = \text{Output} + \text{Imports} = \text{Inputs} + \text{Exports} + \text{GFCF} + \text{HHFCe} + \text{GFCe}
\]

**Suppliers:**
- Output Prices
- MEPI/IPI
- Net Supply IPI

**Demand:**
- Inputs
- GFCF
- HHFCe
- GFCe

**Suppliers:**
- ITD Imports
- Net Supply IPI
- MEPI/IPI
- Output Prices

**Equations:**
- \( \text{IPPI} = \text{IPPI} + \text{Inputs} + \text{Exports} + \text{GFCF} + \text{HHFCe} + \text{GFCe} \)
- \( \text{ITD Imports} = \text{ITD Imports} + \text{Net Supply IPI} + \text{MEPI/IPI} + \text{Output Prices} \)

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Known concerns and developments

- Services Producer Price Indexes
- Services International Trade Indexes
- Volume measurement of Insurance and Financial Services
- Volume measurement of Non-market services, particularly Health and Education
Uses of SUTs in volume terms

1. Measurement of growth of products and industries in volume terms
2. Serves as benchmark for the sub-annual GDP by industry programs
3. Feeds into productivity programs (labour, multifactor productivity, KLEMS database)
4. Feedback to the SUTs at current prices
5. Feedback to the Income and Expenditure Accounts GDP change in volume terms