Compiling SUTs in volume terms
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Agenda

• Introduction
• The recommended compilation approach
• Types of deflators
• Practices in Canada
Introduction
Introduction

• 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.
SUTs in volume terms

• 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.
  • \( \Sigma \text{Output sum} = \Sigma \text{Input} \)
  • 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
Requirements for price and volume indicators

- 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
## Types of deflators

### Output table
- Industrial Producers’ price indices (IPPI)
- 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
  - IPPI
- 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
  - Number of hours worked
- Other taxes and subsidies on production
  - Quantity indicators e.g. building stock / pollution emitted
Types of deflators - Valuation matrices

• 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
  - IPPI for services
- Household final consumption expenditure
  - CPI
Practices in Canada
Canadian approach

• The Canadian approach is almost identical 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.
Canadian approach – Differences

• The difference between the Canadian approach and the approach described earlier is that no Import or Domestic Use Table is created.

• Rather, intermediate inputs and other final uses are deflated using the net supply [Output + Imports – Exports – M&E] implicit price indexes.
# Types of product deflators used in the Canadian SUTs

<table>
<thead>
<tr>
<th>Goods</th>
<th>Supply</th>
<th>Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture products</td>
<td>Output</td>
<td>Imports</td>
</tr>
<tr>
<td>Fish</td>
<td>Unit Value</td>
<td>Net Supply P1</td>
</tr>
<tr>
<td>Forest products</td>
<td>Volume projector</td>
<td>Net Supply P1</td>
</tr>
<tr>
<td>Minerals</td>
<td>Unit Value</td>
<td>Net Supply P1</td>
</tr>
<tr>
<td>Manufactured goods</td>
<td>IPPI</td>
<td>Net Supply P1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Services</th>
<th>Supply</th>
<th>Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture services</td>
<td>IPPI</td>
<td>TID imports</td>
</tr>
<tr>
<td>Forestry services</td>
<td>Input Cost IPPI</td>
<td>TID imports</td>
</tr>
<tr>
<td>Mining and quarrying services</td>
<td>Input Cost IPPI</td>
<td>TID imports</td>
</tr>
<tr>
<td>Residential Construction</td>
<td>NEAU Input Cost/AWE/PPPI</td>
<td>TID imports</td>
</tr>
<tr>
<td>Non-Residential Construction</td>
<td>NEAD Input Cost</td>
<td>TID imports</td>
</tr>
<tr>
<td>Utilities</td>
<td>Volume projector</td>
<td>Net Supply P1</td>
</tr>
<tr>
<td>Manufacturing services</td>
<td>Input Cost</td>
<td>TID imports</td>
</tr>
<tr>
<td>Wholesaleing services</td>
<td>SPPI</td>
<td>TID imports</td>
</tr>
<tr>
<td>Retail services</td>
<td>SPPI</td>
<td>TID imports</td>
</tr>
<tr>
<td>Transportation services</td>
<td>Volume projector/SPPI</td>
<td>TID imports</td>
</tr>
<tr>
<td>Printing products</td>
<td>Volume projector/SIPPI</td>
<td>TID imports</td>
</tr>
<tr>
<td>Motion picture, broadcasting services</td>
<td>Volume projector</td>
<td>TID imports</td>
</tr>
<tr>
<td>Telecommunications services</td>
<td>Volume Projector/SPPI</td>
<td>TID imports</td>
</tr>
<tr>
<td>Internet, computer related services</td>
<td>Volume Projector</td>
<td>TID imports</td>
</tr>
<tr>
<td>Finance and insurance services</td>
<td>Volume Projector</td>
<td>TID imports</td>
</tr>
<tr>
<td>Real estate services</td>
<td>Volume Projector/SPPI</td>
<td>TID imports</td>
</tr>
<tr>
<td>Professional and technical services</td>
<td>AWE/SPPI</td>
<td>TID imports</td>
</tr>
<tr>
<td>Administrative and support services</td>
<td>AWE/SPPI</td>
<td>TID imports</td>
</tr>
<tr>
<td>Waste management services</td>
<td>AWE</td>
<td>TID imports</td>
</tr>
<tr>
<td>Education services</td>
<td>CPF/Hours worked-based</td>
<td>TID imports</td>
</tr>
<tr>
<td>Health care services</td>
<td>CPF/Hours worked-based</td>
<td>TID imports</td>
</tr>
<tr>
<td>Social assistance services</td>
<td>CPF/Standard</td>
<td>TID imports</td>
</tr>
<tr>
<td>Arts, entertainment and recreation services</td>
<td>CPF/Standard</td>
<td>TID imports</td>
</tr>
<tr>
<td>Accommodation services</td>
<td>TASPI</td>
<td>TID imports</td>
</tr>
<tr>
<td>Food and beverage services</td>
<td>AWE</td>
<td>TID imports</td>
</tr>
<tr>
<td>Repair and maintenance services</td>
<td>AWE</td>
<td>TID imports</td>
</tr>
<tr>
<td>Personal services</td>
<td>AWE/CPF excluding taxes</td>
<td>TID imports</td>
</tr>
<tr>
<td>Public administration services</td>
<td>Hours worked-based</td>
<td>TID imports</td>
</tr>
</tbody>
</table>

### Legend:
- IPPI = Industrial Product Price Index
- FIP = Farm Input Price Index
- SPPI = Service Producer Price Index
- AWE = Average Weekly Earnings
- CPI = Consumer Price Index
- MEP/PPI = Import Prices HS10 level, Unit values and IPPI
- Input Cost = Weighted average of IPPI for capital stock and index of AWE
- NEAD = Non-residential Construction
- CE = Consumer Expenditure
- API = Apartment Price Index
- NRBMPI = Non-residential Building Material Price Index
- ICP = Import Export Price Index
Uses of SUTs in volume terms in Canada

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

• SPPI developments
• Issues requiring comprehensive revisions
  • Conceptual: Implementation of SNA 2008 recommendations on measurement of Insurance and FISIM
  • Statistical: Improvement of volume measures of Health based on recommendations of OECD task force
References

• **A Guide to Deflating the Input-Output Accounts: Sources and methods**

• **User Guide: Canadian System of Macroeconomic Accounts. Chapter 4 Supply and use accounts**

• **User Guide: Canadian System of Macroeconomic Accounts. Chapter 7 Price and volume measures**
THANK YOU!

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