

# Compiling SUTs in volume terms

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# Agenda

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





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# 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
  - $\Sigma \text{Output sum} = \Sigma \text{Input}$
  - $\text{Product Supply} = \text{Product Use}$
  - $\text{GDP-Production} = \text{GDP-Income} = \text{GDP-Expenditure}$



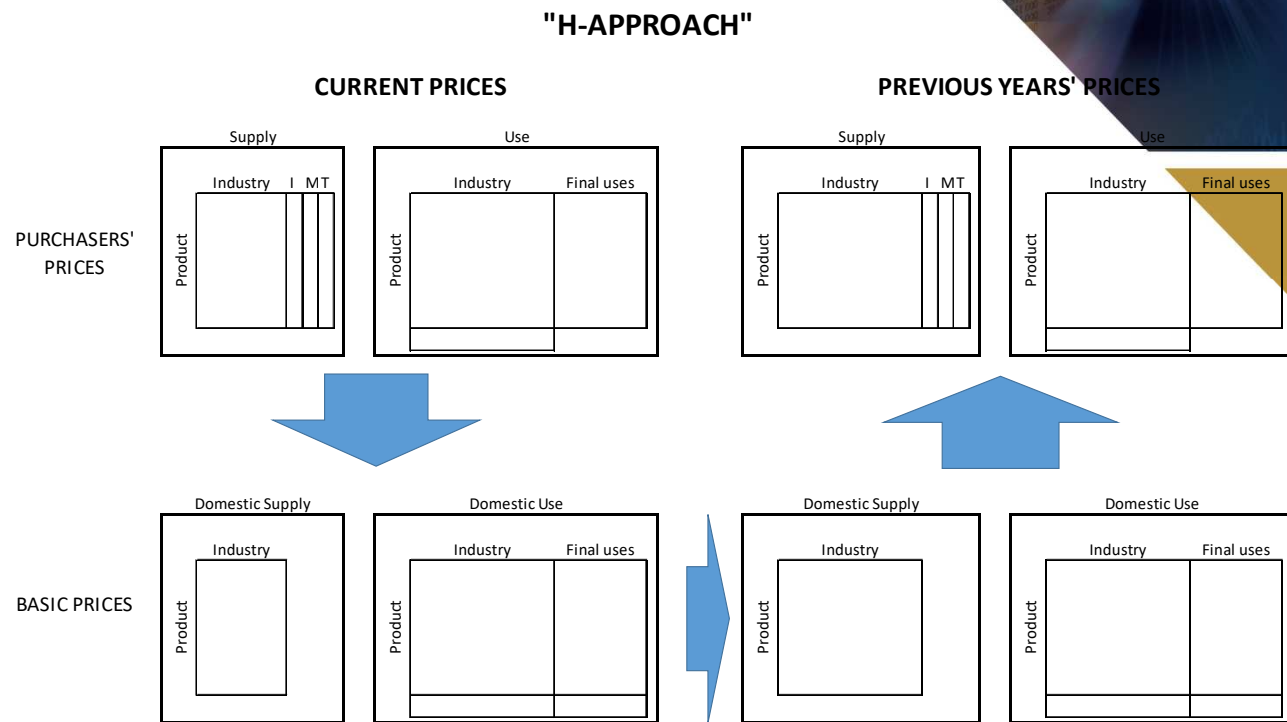


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# Procedural approach to deflating SUTs

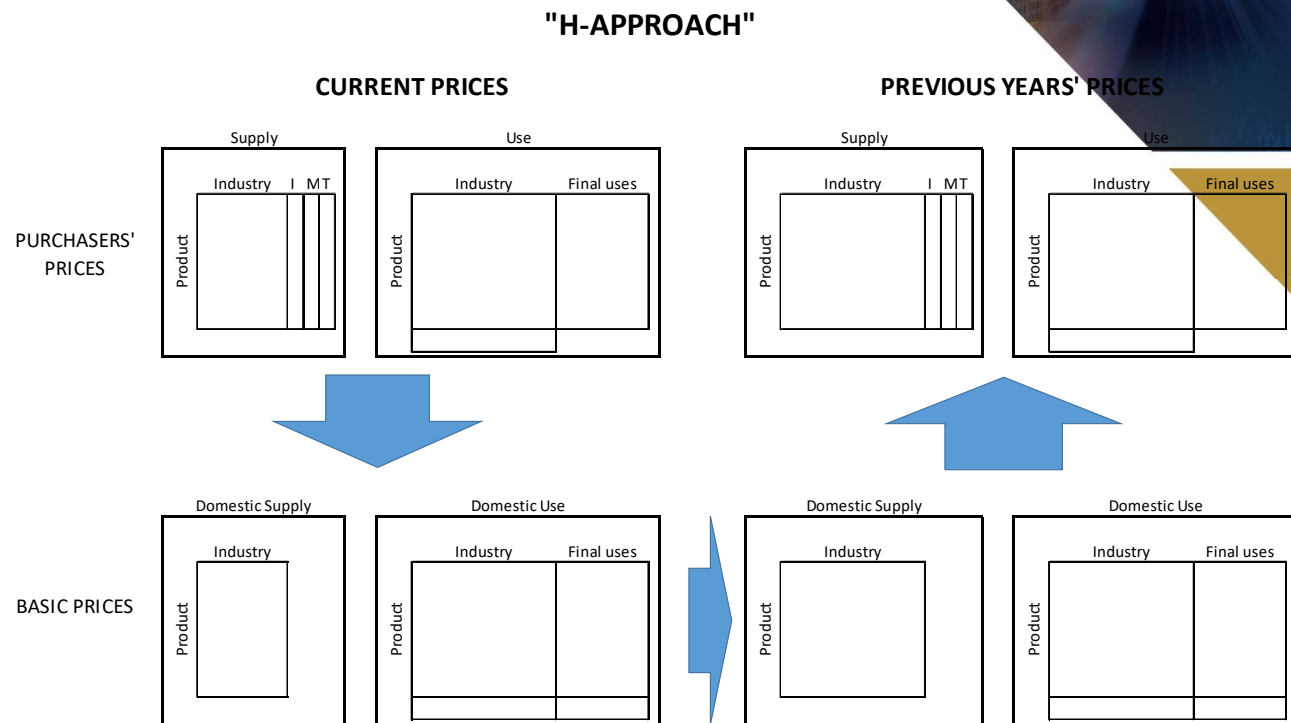
# The H-approach

- 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

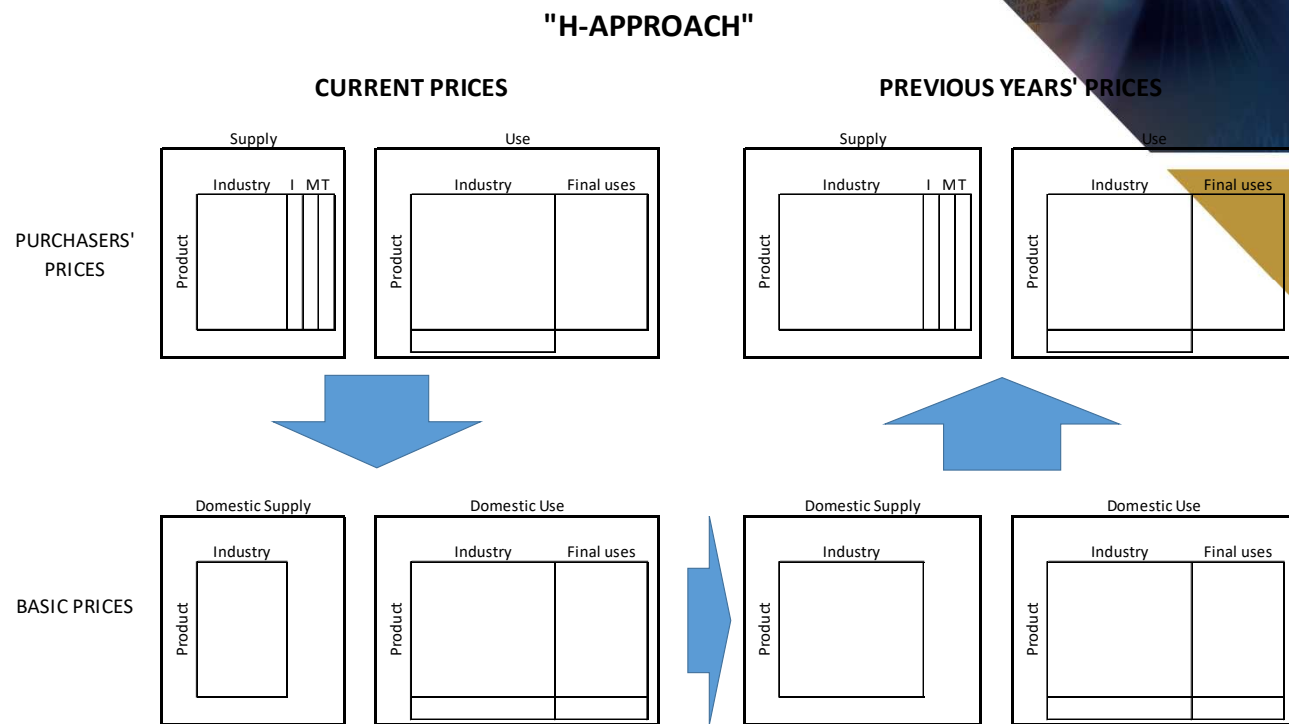
- Step 2: Deflate the Domestic and Imports Use Tables at basic prices using appropriate deflators. Deflate the valuation matrices for taxes, subsidies and margins





# 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.





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# Types of deflators



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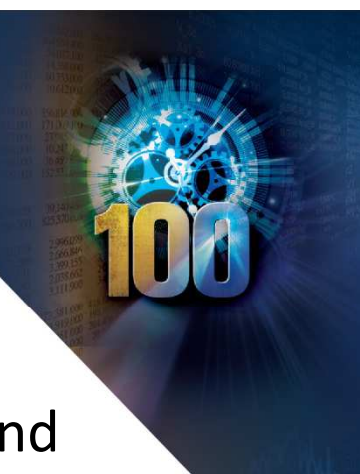
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# Requirements for price and volume indicators

- 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
  - $TR_{t,t-1} = TR_{t-1,t-1} * KB_t$
- 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
  - $T_{t,t-1} = T_{t-1,t-1} * KB_t$

# 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







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# 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.

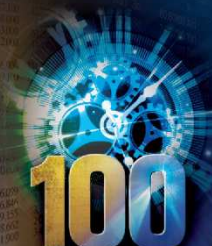


# Canadian approach – Differences

- 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

	C\$	Price index	K\$
<b>Supply</b>	<b>\$1,000</b>		<b>\$955</b>
Output	\$900	5%	\$857
Imports	\$100	2%	\$98
<b>Use</b>	<b>\$1,000</b>		<b>\$617</b>
IC	\$350		
Exports	\$500	6%	\$472
M&E	\$150	3%	\$146
<b>Output + Imports - Exports - M&amp;E</b>	<b>\$350</b>	<b>3.6%</b>	<b>\$338</b>

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# Types of product deflators used in the Canadian SUTs



	Supply		Demand				
	Output	Imports	Inputs	Exports	GFCF	HHFCe	GFCe
<b>Goods</b>							
Agriculture products	Unit Value	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Forest products	Unit Value	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Fish	Unit Value	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Oil and gas	Volume projector	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Minerals	Unit Value/Volume Projector	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Manufactured goods	IPPI	ITD Imports	Net Supply IPI	Output Prices/MXP	MEP/IPI	IPI	IPI
<b>Services</b>							
Agriculture services	FPI	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Forestry services	Input Cost IPI	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Mining and quarrying services	Input Cost IPI	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Residential Construction	NEAD Input Cost/API/NHPI	ITD Imports	Net Supply IPI	Output Prices	NHPI, API, ICP	IPI	IPI
Non-Residential Construction	NEAD Input Cost	ITD Imports	Net Supply IPI	Output Prices	NRBMP, ICP	IPI	IPI
Utilities	Volume projector	Volume projector	Volume projector	Volume projector	Volume projector	Specific Prices	IPI
Manufacturing services	Input Cost	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Wholesaling services	SPPI	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Retail services	SPPI	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Transportation services	Volume Projector/SPPI	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Print publishing products	IPPI	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Motion picture, broadcasting services	CPI-Based	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Telecommunications services	Volume Projector/SPPI	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Internet, computer related services	Volume Projector/SPPI	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Finance and insurance services	Volume Projector	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Real estate services	Volume Projector/SPPI	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Professional and technical services	AWE/SPPI	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Administrative and support services	AWE, SPPI	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Waste management services	AWE	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Education services	CPI/Hours worked-based	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Health care services	CPI/Hours worked based	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Social assistance services	CPI-Based	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Arts, entertainment and recreation services	CPI-Based	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Accommodation services	TASPI	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Meal and beverage services	CPI-Based	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Repair and maintenance services	AWE	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Personal services	AWE/CPI excluding taxes	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI
Public administration services	Hours worked-based	ITD Imports	Net Supply IPI	Output Prices	MEP/IPI	IPI	IPI

## Legend:

IPI=Industrial Product Price Index

FIPI=Farm Input Price Index

SPPI=Service Producer Price Index

AWE=Average Weekly Earnings

CPI= Consumer Price Index

Input Cost:

Weighted average of IPI for capital stock and index of AWE

Weighted average of inputs and index of AWE

NEAD Input Cost

ITD Imports=Import Prices HS10 level, Unit values and IPPI

Net Supply IPI = Implicit prices indices

MEP/IPI =M&E Price Index for M&E products; Net supply IPI for inventories

TASPI= Traveller Accommodation Service Price Index

NHPI=New Housing Price Index

API=Apartment Price Index

BMPI=Building Material Price Index

NRBMPI - Non-residential Building Material Price Index

ICP=Input Cost Price

MPX=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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A graphic in the top right corner featuring a blue globe with data points and the number '100' in a large, bold, blue font with a yellow outline, set against a dark blue background with a yellow triangle at the bottom right.