Lecture 3.
GDP by Production Approach
How to measure gross output?

• **Physical output**
  
  \[ \text{GO} = \text{quantity} \times \text{unit price} \]

• **Disposition**
  
  \[ \text{GO} = \text{Sales} + \text{addition to inventory} + \text{own final use} \]

• **Input cost**
  
  \[ \text{GO} = \text{intermediate consumption (II)} + \text{compensation (COMP)} + \text{consumption of fixed capital (CFC)} + \text{taxes net of subsidies (T-S)} + \text{operating surplus or mixed income (OS/MI)} \]
Where to apply these?

Market goods and services

GO = quantity * unit price
GO = sale
+ change in inventory
+ own final use
GO = Intermediate input
+ compensation
+ taxes net of subsidies
+ consumption of fixed capital
+ operating surplus
Where to apply these?

Non market goods and services, use GO = intermediate input
+ compensation
+ taxes net of subsidies
+ consumption of fixed capital
How to compute gross value added?

**Product:**
\[ \text{GVA} = \text{GO} - \text{II} \]
where:
- \( \text{GO} \) = value of gross output
- \( \text{II} \) = value of intermediate input/ consumption

**Cost:**
\[ \text{GVA} = \text{COMP} + T-S + CFC + \text{OS/MI} \]
Computation of GO and GVA of primary industries

Industries which are extractive and mostly nature based:

A - Agriculture, hunting and forestry
B - Fishing
C - Mining and Quarrying

Statistical units
Enterprise: agricultural households or partnership, corporation, etc
Establishment: farm
General methodology

Crops

1. GO = harvest* unit price
   GVA = GO*GVA

2. GO = sales + own consumption + change in inventory
   GVA = GO - IC
How to treat output of special industries?

• Cultivated assets

GO = Sale + change in inventory + own final use

EX: Cultivated forest

Trees were planted and is expected to be cut for sale after 4 years. The following are the estimated value of opening, closing inventory, intermediate consumption and sale.
Cultivated forest

- GO = Sale + change in inventory + own final use

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closing inventory</td>
<td>100</td>
<td>250</td>
<td>400</td>
<td>0</td>
</tr>
<tr>
<td>Less opening inventory</td>
<td>-0</td>
<td>-100</td>
<td>-250</td>
<td>-400</td>
</tr>
<tr>
<td>= change in inventory</td>
<td>100</td>
<td>150</td>
<td>150</td>
<td>-400</td>
</tr>
<tr>
<td>+ Sales</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>700</td>
</tr>
<tr>
<td>+ own final use</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>= GO</td>
<td>100</td>
<td>150</td>
<td>150</td>
<td>300</td>
</tr>
<tr>
<td>- II/IC</td>
<td>30</td>
<td>70</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>= GVA</td>
<td>70</td>
<td>80</td>
<td>60</td>
<td>200</td>
</tr>
</tbody>
</table>
The services provided for making the goods available to the purchasers

GO = Sale - cost of goods sold

Cost of goods sold = purchases + opening stock - closing stock

GO = sale + (closing - opening) inventory of goods for resale - purchases of goods for resale
Example: The retail store in 2000 recorded the following transactions:

- sale = 50,000
- purchases of goods for sale = 30,000
- opening stock = 5,000
- closing stock = 4,000
- utilities = 200
- supplies = 500
- other services paid = 50

\[
\begin{align*}
\text{GO} & = 50,000 + (5,000 - 4,000) - 30,000 = 21,000 \\
\text{GVA} & = 21,000 - (200 + 500 + 50) = 21,000 - 750 \\
& = 20,250
\end{align*}
\]
GO = service charges and other receipt from services + FISIM

**FISIM** *(financial intermediaries indirectly measured)* is the bank charge which is integrated in the computation of interest rates of deposit and loans.

Formerly referred to imputed services charge

**Imputed service charge** = Interest received from loans – interest paid on deposits
FISIM:

on LOAN = (actual - pure) interest rate

on DEPOSIT = (pure - actual) interest rate

6 % = pure interest rate - FISIM

15% = interest rate plus FISIM

10% (pure interest rate)
Example: household deposited 500 mil and bank lent out 300 mil if the reference rate is 10 % what is the FISIM of bank?

FISIM on deposit = 10% - 6% = 4 percent
FISIM on loan = 15% - 10 = 5 percent

FISIM ON DEPOSIT = 500(0.04) = 20 mil
FISIM ON LOAN = 300(0.10) = 30 mil

There are other deviations in the estimate of FISIM depending upon the availability or choice of reference rate and the data
Other special industries

• Insurance

  Non life or term insurance
  \[ GO = \text{premium payable} + \text{supplemental premium} - \text{claims} \]

  Life insurance
  \[ GO = \text{premium payable} + \text{supplemental premium} - \text{claims} - \text{change in actuarial reserve} \]
How to estimate gross value added?

• Direct estimation

\[ \text{GVA}_t = \text{GO}_t - \text{II}_t \]

where:

- \( \text{GVA}_t \) = gross value added at time \( t \)
- \( \text{GO}_t \) = gross value of output
- \( \text{II}_t \) = value of goods and services used as intermediate input
How to estimate gross value added?

• **Indirect estimation**

1. \( GVA_t = GO_{t-1} \times \text{GO extrapolator} - II_{t-1} \times \text{II extrapolator} \)
2. \( GVA_t = GO_t \times \text{gvar} \)
3. \( GVA_t = GVA_{t-1} \times \frac{GO_t}{GO_{t-1}} \)
   
   \( = GVA_{t-1} \times \text{value extrapolator} \)

\text{gvar} = \text{gross value added ratio} (\text{usually from benchmark estimates})

\text{value extrapolator} = \text{value indicators that can approximate the behavior of the industry}
What are examples of value extrapolators?

- Gross output or gross value added estimates based on sample establishments/enterprise.
- Gross receipts tax on businesses
- employment * average wage rates
- export of commercial crops
- tourist arrival* average number of bednights*average room rate per night
- population growth rate * growth in rent
- etc...
What is benchmark estimate?

- Generally by direct estimation and serves as basis for indirect estimates
- Estimated when data are based on reliable source with full or wide coverage
  - population census (e.g. ownership of dwelling, subsistence farming, etc..)
  - economic census (gva for industries covered, capital formation, etc)
  - household income and expenditure survey (informal production, household consumption expenditure, etc..)
What is benchmark estimate?

- When most of the industries are benchmark estimates, the year is generally used as base year for constant price GDP.
- Used to generate estimation parameters for indirect estimates until the next benchmark estimate.
What are the sources of data

- censuses - for benchmark estimates
- establishment surveys - for extrapolating or updating benchmark estimates
- enterprise reports - for benchmark or extrapolation
- tax reports (Min of Finance) - for extrapolation
- population and price index - for extrapolation
- government finance statistics - benchmarking, updating or extrapolation
- etc..
How is GDP derived from GVA?

- GDP is the sum of all GVA’s of all the industries in the economy
- **GDP (at basic price)**
  \[ \sum GVA(\text{basic price}) \]
- **GDP (at producers price)**
  \[ \sum GVA(\text{producers price}) \]
- **GDP (at purchasers or market price)**
  \[ \sum GVA(\text{basic price}) + T-S \text{ (on products)} \]
Illustrative Example of how VAT is applied in SNA Compilation

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Producer 1</th>
<th>Producer 2</th>
<th>Producer 3</th>
<th>Final Demand</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate input</td>
<td>0</td>
<td>100</td>
<td>300</td>
<td></td>
<td>400</td>
</tr>
<tr>
<td>Value added</td>
<td>100</td>
<td>200</td>
<td>400</td>
<td></td>
<td>700</td>
</tr>
<tr>
<td>Gross output</td>
<td>100</td>
<td>300</td>
<td>700</td>
<td></td>
<td>1100</td>
</tr>
<tr>
<td>VAT</td>
<td>10</td>
<td>30</td>
<td>70</td>
<td></td>
<td>110</td>
</tr>
<tr>
<td>Deductible</td>
<td>0</td>
<td>10</td>
<td>30</td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Non Deductible</td>
<td>10</td>
<td>20</td>
<td>40</td>
<td></td>
<td>70</td>
</tr>
<tr>
<td>Value of sale</td>
<td>110</td>
<td>330</td>
<td>770</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCE</td>
<td></td>
<td></td>
<td></td>
<td>770</td>
<td>770</td>
</tr>
</tbody>
</table>
Interpretation of the table

• The purchasers price of goods used for intermediate input is equal to the basic price
• The total of value added tax from the various flows is equal to the sum of non deductible taxes
• Sum of GVA at basic price = 700
• VAT = 70
• GVA at basic price + VAT = 770
• Value of final demand (PCE)=770
What are the problems compiling GDP by production?

• No available data for estimation
  – subsistence agriculture
  – large establishments
• Lack of support from management
• Inadequate knowledge on some industries
• Lack of confidence in estimation
• Not enough personnel
• Pressure to get the perceived estimates of officials.
How does production affect money flows?

• Only monetary transactions affect the flow of money.
• Subsistence production or production for own use does not affect money flows.
• Barter transactions such as payment of wages in kind does not affect money flows.
• Transactions through credit will not affect money flows at the time of transactions but will be recorded in financial flows.
Thank you