Lecture #16 – Monday, February 2, 2004

MACROECONOMICS

- Output: GDP.
- Employment: employment/unemployment.
- Prices: inflation.

INPUT MARKETS

Households

Total income earned

Output Markets

Total expenditure/production

Firms

NATURAL INCOME ACCOUNTING

- Profits = Total Sales Revenue – Cost of Goods Sold.
  - Cost of Goods Sold: wages/salaries, rent, indirect taxes, purchases from other firms, interest, depreciation.
  - Profits + Cost of Goods Sold = Total Sales Revenue (Income Earned = Expenditure).

<table>
<thead>
<tr>
<th>Cost of Good Sold + Profits</th>
<th>Total Sales Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase of goods and services *</td>
<td>100</td>
</tr>
<tr>
<td>Wages, salaries, benefits</td>
<td>600</td>
</tr>
<tr>
<td>Rents</td>
<td>100</td>
</tr>
<tr>
<td>Interest paid</td>
<td>100</td>
</tr>
<tr>
<td>Indirect Taxes - Subsidies</td>
<td>50</td>
</tr>
<tr>
<td>Depreciation</td>
<td>50</td>
</tr>
</tbody>
</table>

Profits

- Corporate profits: retained
- Corporate profits: dividends
- Corporate profits: taxes

Total 1100

“Purchase of goods and services” and “Capital sales to businesses” must be netted out.

<table>
<thead>
<tr>
<th>Cost of Good Sold + Profits</th>
<th>Total Sales Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wages, salaries, benefits</td>
<td>600</td>
</tr>
<tr>
<td>Rents</td>
<td>100</td>
</tr>
<tr>
<td>Interest</td>
<td>100</td>
</tr>
<tr>
<td>Corporate profits</td>
<td>100</td>
</tr>
<tr>
<td>Domestic Income (at factor cost)</td>
<td>900</td>
</tr>
<tr>
<td>Indirect Taxes - Subsidies</td>
<td>50</td>
</tr>
<tr>
<td>Subsidies</td>
<td></td>
</tr>
<tr>
<td>Net Domestic Product (NDP)</td>
<td>950</td>
</tr>
<tr>
<td>Depreciation</td>
<td>50</td>
</tr>
</tbody>
</table>
Lecture #17 – Monday, February 9, 2004

**INTERMEDIATE SALES AND VALUED ADDED**

**Example**

<table>
<thead>
<tr>
<th></th>
<th>Sales</th>
<th>Purchase From Other Firms</th>
<th>Value Added</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>10</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Flour</td>
<td>25</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Bread</td>
<td>50</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>85</td>
<td>35</td>
<td>50</td>
</tr>
</tbody>
</table>

- Proper contribution = 50.
- Bread is the final product (brought by consumers).

**REAL VS. NOMINAL**

- **Real**: Figures adjusted for average price increases and inflation.
- **Nominal**: Figures not adjusted for average price increases and inflation.

**PRICE INDEX**

- Helps determine whether increases in GDP is prices or production.

**Examples**

- “GDP deflator”, CPI (consumer price index).

**Challenges**

- Changing prices.
- Weighting – what is more important?
- What is included? What is not included?
- New/changing products.

**GDP vs. GNP**

- **Gross Domestic Product**
  - Measures economic activities.
  - Ignores who owns the factors of production.

- **Gross National Product**
  - Concentrates on who owns the assets – tracing where profits goes.
**OUTPUT/GDP GAP**
- Potential GDP vs. Actual GDP.
- Employment vs. Unemployment.

**LABOUR FORCE**
- $LF = E + U$.
- $U_{rate} = \frac{U}{LF}$.

**Issues**
- Full employment = no unemployment? No. There is always frictional unemployment (between jobs).
- Definition of unemployment differ country to country:
  - US: not active = not in labour force
  - Canada: no job = unemployment

**KEYNESIAN MODEL**
- $GDP = C + I + G + X - M$.

**Assumptions**
- Only $C$ and $I - G, X, M = 0$.
- No inflation – nominal = real.
- More output until $Y_F$ (full employment GDP).

**HOUSEHOLDS AND CONSUMPTION**
- $C = C$(income, assets/wealth, interest rate). We’ll use $C = C(Y)$.
  - $\frac{AC}{AY} > 0$ because higher income, more stuff. This rate is called the marginal propensity to consume (MPC).
  - Also, $\frac{AC}{AY} = MPC < 1$.
- $S = Y - C$ – savings is what is not spent.
- $MPC + MPS = 1$. 
Consumption Function

- \( C = 10 + 0.8Y \).
- \( \frac{\Delta C}{\Delta Y} = MPC = 0.8 \).

Savings Function

- \( S = Y - C = Y - 10 - 0.8Y = -10 + 0.2Y \).
- \( \frac{\Delta S}{\Delta Y} = MPS = 0.2 \).

Investment Function

- \( I = 10 \).

Total Demand For Output (AE)

- \( AE = C + I = 10 + 10 + 0.8Y = 20 + 0.8Y \).
Equilibrium

- Supply = Demand.
- \( Y = AE = 20 + 0.8Y \Rightarrow Y^* = 100 \).
- \( Y_1 \): Below equilibrium – \( D > S \), inventory decreases, shifts economy outward.
- \( Y_2 \): Above equilibrium – \( S > D \), inventory increases, shifts economy inward.

Lecture #18 – Monday, February 23, 2004

The Multiplier

- If \( I = 11 \), then:
  - \( C = 10 + 0.8Y \) \( \Rightarrow AE = 21 + 0.8Y \). Since \( Y = AE \) at equilibrium, \( Y = 21 + 0.8Y \Rightarrow Y^{**} = 105 \).
  - \( I = 1 \), \( \Delta Y = 5 \).
  - The multiplier \( K_1 = \frac{\Delta Y}{\Delta I} = 5 \). In general, \( K = \frac{1}{1 - \text{slope of } AE} = \frac{1}{1 - MPC} \).

Savings-Investment/Withdrawal-Injection View of Equilibrium

- \( C = 10 + 0.8Y \).
- \( Y = C + S \Rightarrow S = Y - C = -10 + 0.2Y \).
- \( Y = AE = C + I \) for equilibrium.
- \( Y - C = I \) for equilibrium.
- \( S = I \) for equilibrium.

- \( Y_1 \): Injection > withdrawal, GDP rises.
- \( Y_2 \): Withdrawal > Injection, GDP falls.

Adding The Government

- \( AE = C + I + G \).
- \( C = C(Y_d) \), \( Y_d \) is the disposable income. \( Y_d = Y - T \).
- \( C = 102 + 0.8Y_d \). \( I = 100 \), \( G = 200 \). \( Y_dY - T \), \( T = 240 \) (lump-sum taxes).
- So, at equilibrium, \( AE = Y \Rightarrow C + I + G = Y \Rightarrow 102 + 0.8(Y - 240) + 100 + 200 = Y \Rightarrow Y^* = 1050 \).
The economy can come to rest far from $Y_F$.

Shift $AE$ up (to eliminate the deflationary gap and GDP gap):
- Increase $G$.
- Decrease $T$.
- Increase $I$.

GDP gap = $Y_F - Y^* = 1250 - 1050 = 200$. What is the $\Delta G$ required? Need to know

$$K_G = \frac{1}{1-\text{slope of } AE} = 5.$$ So, the $\Delta G$ required is $\frac{200}{5} = 40$.

By how much taxes does the government have to change to eliminate the GDP gap?

$$K_T = -\frac{MPC}{1-\text{slope of } AE} = -\frac{0.8}{0.2} = -4.$$ So, the $\Delta T$ required is $\frac{200}{-5} = -50$.

**Government Budget**
- Deficit (as a positive number): $G - T + TR$, $TR$ is transfer payments.
- Balanced budget change in spending: $\Delta G = \Delta T$.

$$K_{BBM} = K_G + K_T = \frac{1}{1-\text{slope of } AE} + \frac{-MPC}{1-\text{slope of } AE} = 1.$$

**VARIABLE PRICE MODEL: AD & AS (SHORT RUN)**

Why is $AD$ negatively-sloped?
1) As real value of money decreases, $P$ increases.
2) As real value of government decreases, $P$ increases.
3) International substitution: as $P$ increases, $M$ increases and $X$ decreases.
4) Interest rate effect: as $P$ increases, $r$ increases and $I$ decreases.

Why is $AS$ positively-sloped?
1) Cost increases as you produces more, so $P$ increases.
**Relation to AE**

![Graph showing the relationship between AE and Y]

**Shifts in AD and AS**

- **Consumer confidence increases:**
  - $C$ shifts up.
  - $AD$ shifts up.

- **Government encourages business spending:**
  - $I$ shifts up.
  - $AD$ shifts up.

- **More productive workers:**
  - $P$ decreases.
  - $AS$ shifts down.
Is the simple $k$ multiplier too large?

- Simple model: $Y_1 \rightarrow Y_3$ – too big!
- No perfectly elastic schedule: $Y_1 \rightarrow Y_2$.

Lecture #19 – Monday, March 1, 2004

The Multiplier In General

\[ k = \frac{\Delta Y}{\Delta A} \]

Proof:
- $\Delta Y = \Delta A + b$.
- slope of $AE = \frac{b}{\Delta Y} \Rightarrow b = \Delta Y \text{(slope of } AE)$. 
  \[ \Delta Y = \Delta A + \Delta Y \text{(slope of } AE) \]
- $\Rightarrow \Delta Y (1 – \text{slope of } AE) = \Delta A$.
  \[ \Rightarrow \frac{\Delta Y}{\Delta A} \frac{1}{1-(\text{slope of } AE)} = k \]

MONEY

Functions
- Medium of exchange – something everyone accepts.
- Store of value – an asset, capacity to store purchasing power.
- Unit of account – all accounting are done in money term.

What Is Money?
- Legal tender – coins and bills ($\sqrt{M1}$)
- Cheques ($\sqrt{M1}$)
- Electronic transfers (debit card) ($\sqrt{M1}$)
- Government bearer bonds ($\times$)
- Credit cards ($\times$)
- Equities/stocks ($\times$)
- Gold ($\times$)
- Fixed assets – land, property ($\times$)
• Foreign currency (√ included in M3)

**Definition of Money (M1)**
- M1: currency in circulation (CIC) + demand deposits (DD).
- M2: M1 + personal savings deposits + non-personal notice deposits.
- M2+: M2 + deposits at trust companies, credit unions, etc.
- M3: M2+ + non-personal term deposits + foreign currency deposits.

**MONEY AND BANKING**

**T-Accounts/Balance Sheets**

<table>
<thead>
<tr>
<th>Assets</th>
<th>Bank</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash: +10</td>
<td>DD: +10</td>
<td></td>
</tr>
<tr>
<td>Cash: +100</td>
<td>DD: +100</td>
<td></td>
</tr>
<tr>
<td>Cash: +10000</td>
<td>DD: +100000</td>
<td></td>
</tr>
<tr>
<td>Cash: -10</td>
<td>DD: -10</td>
<td></td>
</tr>
<tr>
<td>Cash: -100</td>
<td>DD: -100</td>
<td></td>
</tr>
<tr>
<td>Cash: -1000</td>
<td>DD: -1000</td>
<td></td>
</tr>
<tr>
<td>Cash: +50</td>
<td>DD: +500</td>
<td></td>
</tr>
<tr>
<td>Loan: +100</td>
<td>DD: +100</td>
<td></td>
</tr>
</tbody>
</table>

**Reserve Ratio**
- Not everyone demands their cash at the same time – no need for 100% reserves.
- Reserve Ratio = \( \text{reserves} / \text{DD} \).
- Risk for banks: might run out of money if reserves too low.
- Multiplier: \( \Delta DD = \frac{1}{rr} \Delta R \), \( rr \) = reserve ratio, \( \Delta R \) = increase in reserves.

**Lecture #20 – Monday, March 8, 2004**

**CONTROL OF MONEY SUPPLY**

**Open Market Operations**
- There is a market in government bonds.
- Suppose the Central Bank buys $100 of government bonds:

<table>
<thead>
<tr>
<th>Public</th>
<th>Chartered Banks</th>
<th>Bank of Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>L</td>
<td>A</td>
</tr>
<tr>
<td>Bonds: -100</td>
<td>Cash: +100</td>
<td>Cash: +100</td>
</tr>
<tr>
<td>Cash: +100</td>
<td>Cash: -100</td>
<td>Reserves: +100</td>
</tr>
<tr>
<td>Cash: -100</td>
<td>Reserves: +100</td>
<td>DD: +100</td>
</tr>
<tr>
<td></td>
<td>Public</td>
<td>Chartered Banks</td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
<td>-----------------</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>L</td>
</tr>
<tr>
<td>Bonds: -100</td>
<td></td>
<td>R (DD): +100</td>
</tr>
<tr>
<td>DD: +100</td>
<td></td>
<td>DD: +100</td>
</tr>
<tr>
<td>DD: +900</td>
<td>Loans: +900</td>
<td>Loans: +900</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cash: +100</td>
</tr>
</tbody>
</table>

- DD grows to $1000.

### Swap of Government Deposits
- Governments have accounts in both chartered banks and the Central Bank.

<table>
<thead>
<tr>
<th></th>
<th>Public</th>
<th>Chartered Bank</th>
<th>A</th>
<th>L</th>
<th>A</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>R (DD at BC): +100</td>
<td></td>
<td>DD of G: +100</td>
<td>Loans: +900</td>
<td>DD: +900</td>
<td>DD of G: -100</td>
<td>DD of Banks: +100</td>
</tr>
<tr>
<td>Loans: +900</td>
<td></td>
<td>DD: +900</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Government puts $100 into chartered banks – money supply grows by $1000.

---

**Lecture # 21 – Monday, March 15, 2004**

**GOVERNMENT EXPENDITURE AND THE MONEY SUPPLY**

How does the government finance spending?

1) Tax-financed.
2) Bond-financed.
3) Money-financed.

### Tax-Financed Spending

Suppose the government taxes $100 and spends $100:

<table>
<thead>
<tr>
<th></th>
<th>Public</th>
<th>Chartered Banks</th>
<th>Central Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>DD: -100</td>
<td>NW: -100</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Money supply increases because the Balanced Budget Multiplier \( k_{BBM} > 0 \). So there is always going to be an expansionary trend.
Bond-Financed Spending

Suppose the government issues $100 of bonds to the public and spends that $100:

<table>
<thead>
<tr>
<th>Public</th>
<th>Chartered Banks</th>
<th>Central Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>DD: -100</td>
<td>Bonds: +100</td>
<td>DD (G): +100</td>
</tr>
<tr>
<td>DD: +100</td>
<td>NW: 100</td>
<td>DD (P): -100</td>
</tr>
<tr>
<td>DD: +100</td>
<td>NW: +100</td>
<td>DD (G): -100</td>
</tr>
<tr>
<td>DD: +900</td>
<td>L: +900</td>
<td>DD (P): +100</td>
</tr>
</tbody>
</table>

- Does not change the money supply.

Money-Financed Spending

Suppose the government issues $100 of bonds to the central bank and spends that $100 (assume reserve ratio is 10%):

<table>
<thead>
<tr>
<th>Public</th>
<th>Chartered Banks</th>
<th>Central Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>R: +10</td>
<td>DD (G): +100</td>
<td>Bonds: +100</td>
</tr>
<tr>
<td>L: +90</td>
<td>DD (P): -100</td>
<td>DD (G): +100</td>
</tr>
<tr>
<td>DD: +900</td>
<td>L: +900</td>
<td>DD (P): +100</td>
</tr>
</tbody>
</table>

- The money supply increases rapidly – may lead to inflation.
- Question: How much power/independence should to the Central Bank have for allowing this to happen?

**IMPACT OF MONEY**

- $L_t$: Transaction Demand – $L_t(Y, r)$.
- $L_p$: Pre-cautionary Demand – $L_p(Y, r)$.
- $L_s$: Speculative Demand – next time.

- Note: $\frac{\Delta L_t}{\Delta Y} > 0$ and $\frac{\Delta L_s}{\Delta r} < 0$.

Suppose, through monetary policy, there is an increase in the money supply:
There is a “Feedback Effect” because $Y$ changes!

**Simple $K$ Multiplier**

For the same reason as above, the simple $K$ multiplier $K = \frac{1}{1 - \text{slope } AE}$ is too large – a change in $Y$ will lead to change in $r$, which leads to change in $I$, which then leads back to change in $AE$. 