Chapter 5

Model Government as entity that consumes G of output but must abide by Government Budget Constraint (no budget surpluses or deficits)

$$\begin{aligned}
G &= T \Longrightarrow \text{ Government spending ... taxes} \\
\text{Exogenous Variables} &= (G, Z, K) \\
\text{Endogenous Variables} &= (C, N^s, N^d, T, Y, w) \\
\text{Competitive Equilibrium} &\Longrightarrow \text{ consumes and forms arc price (i.e., wage) takers.} \\
&\Longrightarrow \text{ equilibrium wage is above } N^s(w) = N^D(w) \\
&\Longrightarrow \text{ Agent Max } U[c, l] \text{ s.t., budget constant } C = D - T + wN^s \\
&\Longrightarrow \text{ firms maximizes profits } D = \max_N \left\{ZF(K, N^D) - wN^D\right\} \\
G &= T
\end{aligned}$$

Note: Combining

* $C = D - T + wN^s$
* $D = Y - wN$
* $G = T$

We find $Y = C + G =$ Income/Expenditure equality

Define : Products Possibility Factor (PPF) = Consumption as a factor of leisure
$C = Y - G = ZF(K, h - l) - G$
$C(l) = ZF(K, h - l) - G$ taking (Z, K, h, G) as exogenous.

Define : Marginal Rate of Transformation (MRT) = rate can convert one good into another

$$\begin{aligned}
-\frac{\partial c}{\partial l} &= -\frac{\partial Y}{\partial N}\frac{\partial N}{\partial l} = \frac{\partial Y}{\partial N} \Rightarrow \text{ since, } \frac{\partial N}{\partial l} = -1 \\
MRT_{l,c} = MP_N &= -\text{slope of PPF}
\end{aligned}$$

Next step : combine PPF with indifference curves.

At equilibrium, Tangent of PPF = tangent of indifference curves.

-slope at the tangent will equal minus wage

$\Longrightarrow MRS_{l,c} = MRT_{l,k} = MP_N$

Proof :

$$\begin{aligned}
D &= \max_N \left[Y(N) - wN\right] \\
\text{FOC} : 0 &= \frac{\partial Y}{\partial N} - w \\
\text{Consumer : } \max U\left[c, l = h - N\right] s.t., C &= D - T + wN \\
&= U\left[c, l = h - N\right] + \lambda\left[D - T + wN - C\right]
\end{aligned}$$

$$\begin{aligned}
\text{FOC}: \frac{\partial}{\partial N}: 0 &= U_l(-1) + \lambda w \\
\frac{\partial}{\partial c}: 0 &= U_c - \lambda \\
\frac{U_l}{U_c} &= w
\end{aligned}$$

Optimality

Connection betwen competitive ... and economic efficiency ... for two resons.

- Show how free markets can produce socially optional outcomes.
- ... to analyze social optimum then a competitive equliibrium.

Define : A competitive equlibrium is "Pareto Optional" if there is no way to make ... better off without ... wage off.

Introduce social planner $\Rightarrow$ no need for markets, and thus no need for prices/wages.

$$\begin{aligned}
\text{Objective}: \max_{(c,l)} U(c,l) \text{ such that, } C &= D - T + w(h-l) \\
&= Y(h-l) - T \\
... &= U(c,l) + \lambda(Y(h-l) - T - C) \\
\frac{\partial}{\partial c}: 0 &= U_c - \lambda \\
\frac{\partial}{\partial l}: 0 &= U_l - \lambda \frac{\partial Y}{\partial N}(-1) \\
U_c &= \lambda \\
U_l &= \lambda \frac{1}{N} \\
\frac{U_l}{U_c} &= \frac{1}{N}
\end{aligned} \tag{1}$$

Thus, MPL = MRS, just as in the competitive equlibrium case.

First Fundamental Theorem of Welfare Economics : under certain conditions, competitive equlibirum is Pareto Optimal.

Second Fundamental Theorem of Welfare Economics : under certain conditions, a Pareto Optimal is competitive equlibirum.

Adam Smith, wealth of nations, " Unrestricted market economy would behave as it ... invisible hand were ... actions that were beneficial for all"

Sources of Social Inefficiencies

(1) Externalities : ... problem is that there is not a market to ... externaly
negative: firm does not pay for pollution
positive: frim not compensated for external benefit

(2) Distorting taxes : For example, proportional wage tax
effective wage $\equiv w(1-T)$

$$\left.\begin{array}{l}\text{Consumer optimization : } MRS = w(1-T)\\ \text{Firm optimization : } MPL = w\end{array}\right\} MRS < MPL$$

Tax derives a wedge between MRS and MPL

(3) Firms (or workers) not price takers.

(4) Incomplete Markets (Externality is a special case)

$\Delta G \uparrow$ on :

(1) $\Delta Y \uparrow$

(2) $\Delta c \downarrow$

(3) $\Delta l \downarrow$

(4) $\Delta w \downarrow$

Basically, increase in ... spending, and hence, an increase in ... syntax, has a negative increase effect. This ... both consumption and leisure. Less leisure means more labor, means more output. More labor supply imples lower wages.

$\Delta Z \uparrow$ on :

(1) $\Delta Y \uparrow$

(2) $\Delta c \uparrow$

(3) Δl intermediate; need it to drop for ... with ... cycles.

(4) $\Delta w \uparrow$

$Z \uparrow$ imples $MPL = \frac{\partial V}{\partial N}$ increases. This will create a positive income effect, but it will also make leisure more expensive (i.e., wages are higher)thus there is a susbititution effect causing consumption further, bit more than leisure indeterminate.

For model to be consistent with business cycling need $\Delta Z \uparrow \Rightarrow \Delta N \uparrow (\Delta l \downarrow)$ tat is, for substitution effect to dominate income effect. Now, in long run, since N = constant, we have income effect ... substitution effect. But, can argue that ..., substitution effect dominates.

Emprically, shocks to productivity appear to play a role in business cycles.

Diluting tax on Wage Income