LECTURE NOTES

Chapter 5: The Keynesian System (I): The Role of Aggregate Demand

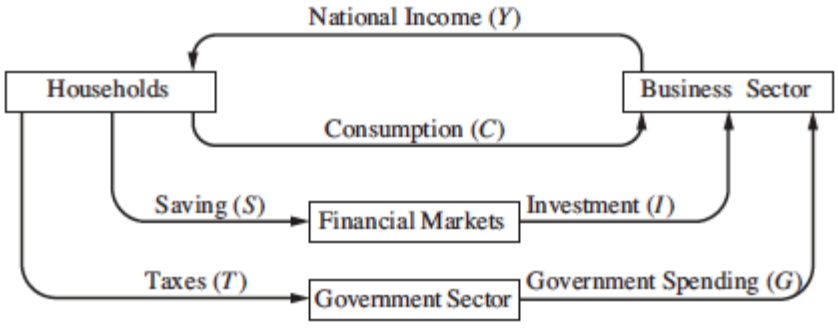
1. The Problem of Unemployment

- Keynesian economics developed in the context of the Great Depression
    - Sharp fall in GDP
    - High rate of unemployment (25%)
    - Keynes book was written for the particular case of the U.K. (but the title is "General Theory")
    - The problem of high unemployment is a deficiency in Aggregate Demand
        - Investment was too low
        - Remember: MV = Py = NGDP = C + I + G + NX
- Keynesian economics argues that Aggregate Demand deficiency can be compensated with government spending on public works (expansionary fiscal policy.)
    - In Keynes's words: "socialize investment."
- Lionel Robbins on the treatment of classical economists (emphasis added):
    - "On this plane, *not only is any real knowledge of the classical writer non-existent* but further *their place has been taken by a set of mythological figures*, passing by the same names, but not infrequently invested with attitudes almost exactly the reverse of the those which the originals adopted. *These dummies are very malignant creatures indeed* […] They can conceive of no function of the state than that of the night watchman […] Hence, when a popular writer of the day wishes to present his own point of view in a specially favourable setting*, he has only to point the contrast with the attitude of these reprehensible people and the desired effect is produced*." Robbins, L. (1952). *The Theory of Economic Policy*. London: Macmillan. p. 5.

2. The Simple Keynesian Model: Conditions for Equilibrium Output

- In Keynesian models equilibrium requires *output* to equal *aggregate demand*
    - $Y \equiv C + I_r$ (realized investment)+ T [output]
    - $Y = E = C + I$ (desired investment) + G [AD]
    - $Y \equiv C + S + T$ [Income]
- Equilibrium conditions
    - $Y = E = C + I$ (desired investment) + G
    - $S + T = I + G$
    - $I_r = I$
        - These two can differ if inventories changed unexpectedly $(I_r - I)$
- There are no retained earnings, therefore
    - All business profits go to the households as dividends, wage, etc., income
- Household's income is distributed through three channels
    - To business by (1) consumption and (2) to investment through savings
    - To (3) government spending through taxes
    - Consumption is a direct link between household's income and the productive sector
    - But there are two *likeages* (income not going from the household to the business sector):
        - Savings in the financial markets (what if investment is in financial assets?)
        - (Net) taxes paid to the government (what if some tax revenue is not spent?)
    - Also *injections*
        - Business demand for output (rather than the household)
        - Government spending (if G > T)

FIGURE 5-2 Circular Flow of Income and Output

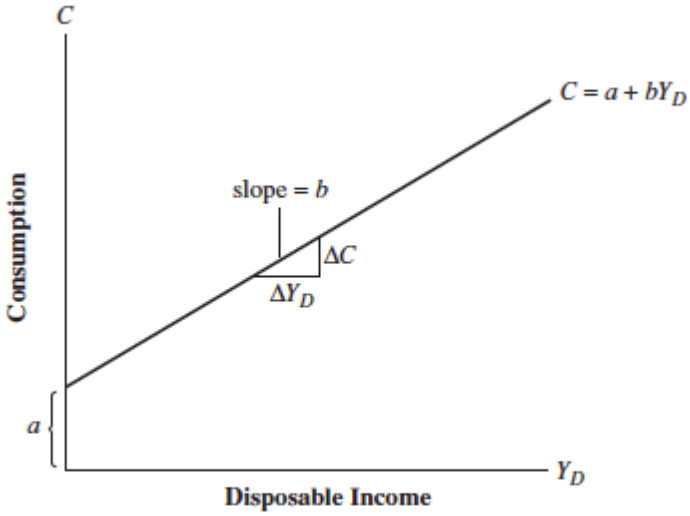


- If output > aggregate demand
    - $Y > E$
    - $C + I_r + G > C + I + G$
    - $I_r > I$
- If output < aggregate demand
    - $Y < E$
    - $C + I_r + G < C + I + G$
    - $I_r < I$

3. The Components of Aggregate Demand

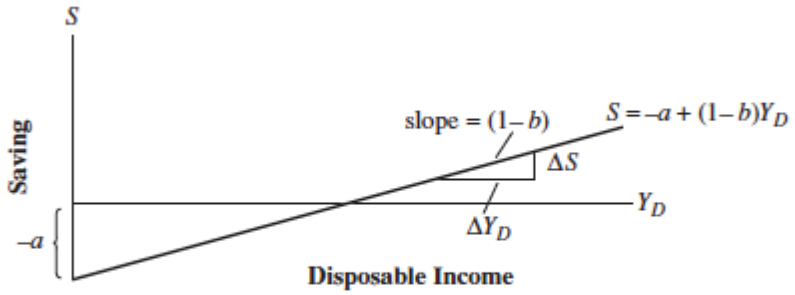
- Consumption
  - $C = a + b \cdot Y_D, \;\; a > 0, \;\; 0 < b < 1$
  - a: effect on consumption other than disposable income
  - $b = \frac{\Delta C}{\Delta Y_D}$ is the marginal propensity to consume (MPC)
  - Also: $Y_D \equiv Y - T \equiv C + S$. Then: $S \equiv Y_D - C$
    - Do some math…
  - $S = -a + (1 - b) \cdot Y_D$
  - $1 - b = \frac{\Delta S}{\Delta Y_D}$ is the marginal propensity to save (MPS)
  - $MPC + MPS = 1$
  - Though other variables (i.e. wealth) also affect consumption, in this model disposable income is the main driver of consumption which is the mayor component of GDP

FIGURE 5-3 Keynesian Consumption Function



The consumption function shows the level of consumption (C) corresponding to each level of disposable income (Y_D). The slope of the consumption function ($\Delta C / \Delta Y_D$) is the marginal propensity to consume (b), the increase in consumption per unit increase in disposable income. The intercept for the consumption function (a) is the (positive) level of consumption at a zero level of disposable income.

FIGURE 5-4 Keynesian Saving Function



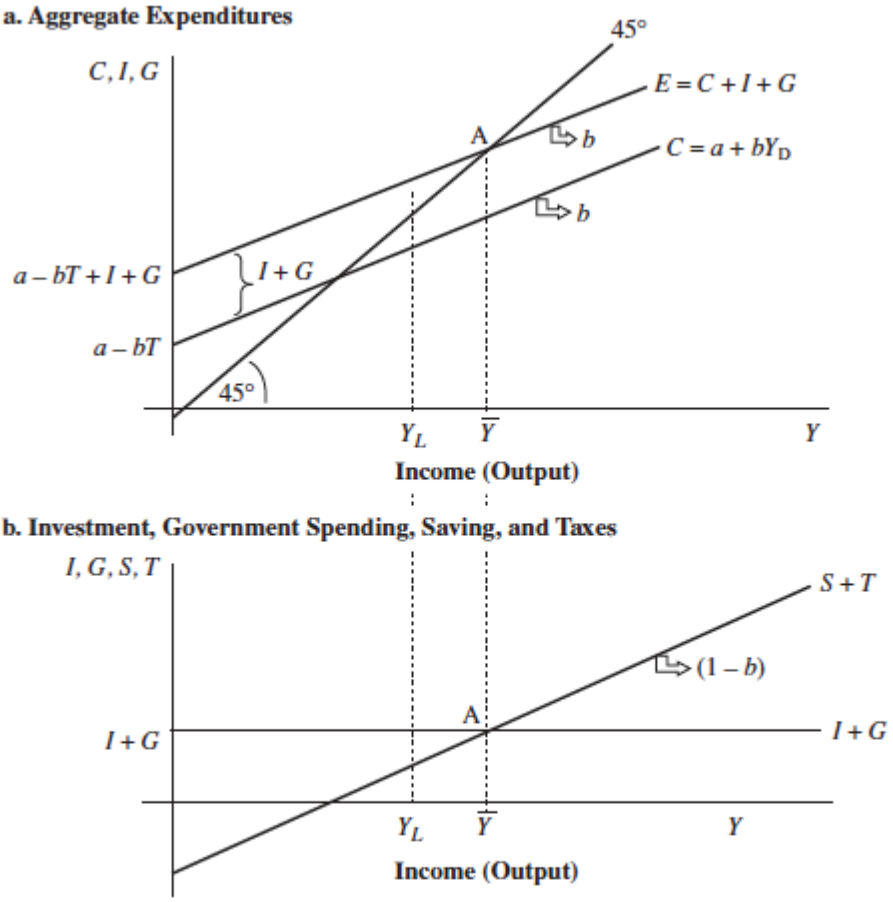
The saving function shows the level of saving (S) at each level of disposable income (Y_D). The slope of the saving function is the MPS ($1 - b$), the increase in saving per unit increase in disposable income. The intercept for the saving function ($-a$) is the (negative) level of saving at a zero level of disposable income.

- Investment
    - Consumption is a stable function of disposable income
    - Investment is not
    - Autonomous components of AD: determined independently of the level of income
        - Investment (more volatile)
        - Government spending (less volatile and manageable by policy makers)
    - AD = consumption + autonomous consumption
    - Investment decisions
        - Similar theory about interest rates
        - Entrepreneurs linearly extrapolate the past into the future
        - Entrepreneurs rely on the beliefs of other entrepreneurs
        - Then:
            - Investment is subject to big changes due to “animal spirits” (fears, hopes, etc.)
- Government spending and taxes
    - Defined by the policy makers -> unrelated to the level of income
    - Taxes are also defined by the policy makers, not by income

4. Determining Equilibrium Income

- Equilibrium condition
  - $Y = E = C + I + G$
  - $Y = E = a + bY_D + I + G$
  - $Y = E = a + bY - bT + I + G$
  - $Y = \underbrace{\frac{1}{1-b}}_{\substack{autonomous\\ expenditure\\ multiplier}} \cdot \underbrace{(a - bT + I + G)}_{autonomous\ expenditures}$

FIGURE 5-5 Determination of Equilibrium Income



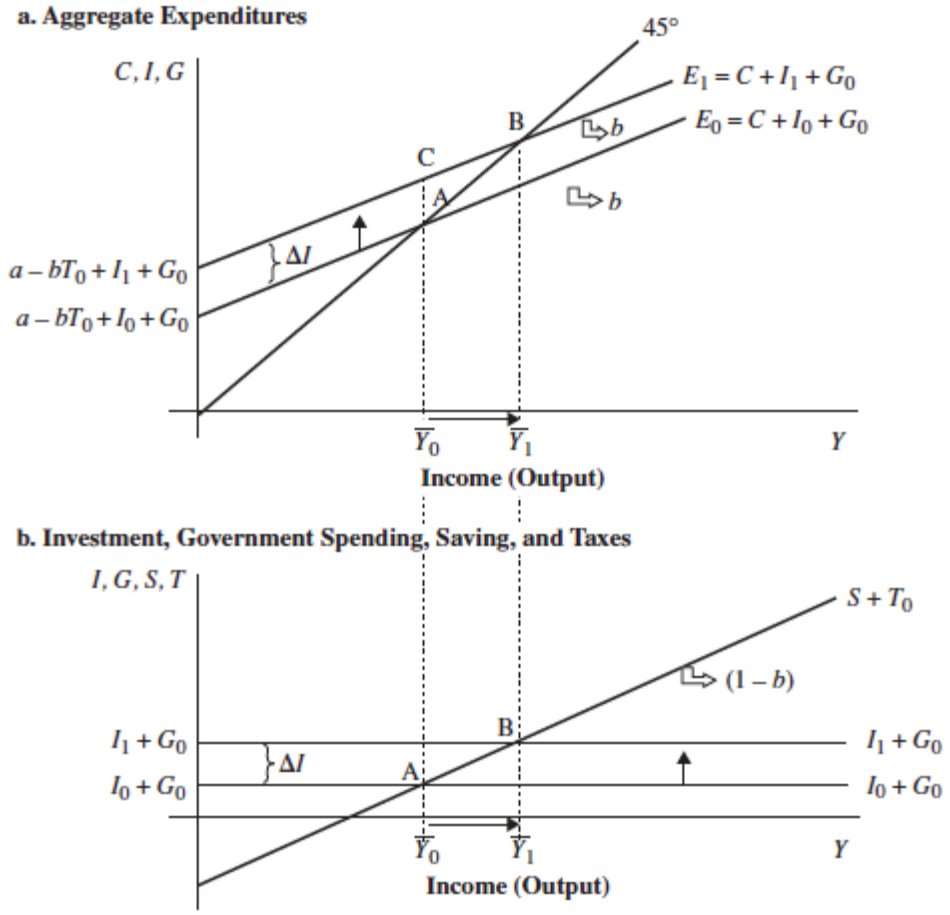
In part a, equilibrium income is $\overline{Y}$, at point A where the $C + I + G = E$ schedule intersects the 45° line. At that point, aggregate expenditures equal output, $(C + I + G) = Y$. At point A in part *b*, at the equilibrium level of output, $\overline{Y}$, the $S + T$ and $I + G$ schedules intersect, so $S + T = I + G$. At the level of income Y_L, which is less than equilibrium output $\overline{Y}$, aggregate demand exceeds output, $(C + I + G) > Y$. At points greater than equilibrium output $\overline{Y}$, output exceeds aggregate demand.

- Assume Y < AD
    - Inventories fall
    - Then business increase investment
    - Therefore Y increases until equilibrium is reached
- Assume Y > AD
    - Inventories rise
    - Then business decrease investment
    - Therefore Y decreases until equilibrium is reached

5. Changes in Equilibrium Income

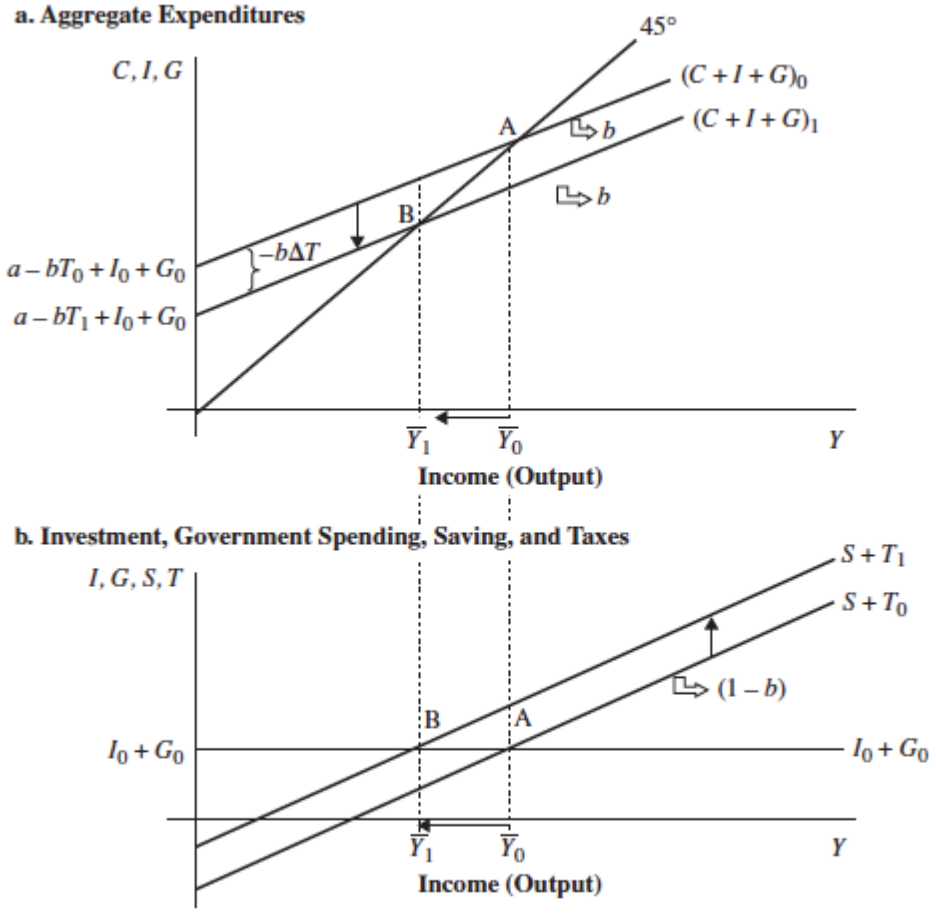
- $\frac{\Delta Y}{\Delta I} = \frac{\Delta Y}{\Delta G} = \frac{1}{(1-b)} = \frac{1}{1-MPC} = \frac{1}{MPS}$
- Keynesian multiplier: $\frac{1}{MPS}$
- Because $0 < b < 1$, Keynesian multiplier > 1
- Then: $\Delta Y > \Delta I \; and \; \Delta Y > \Delta G$
- Equilibrium condition *after* a shock
    - $\Delta Y = \Delta C + \Delta I$
    - $\Delta Y - \Delta C = \Delta I$
    - $\Delta S = \Delta I$
    - And because $S + T = I + G$
    - $\Delta S - \Delta I = \Delta G - \Delta T$
    - $\Delta S - \Delta I = \Delta G$ (if net Taxes are constant)
        - *G* needs to compensate for net savings not invested
- Change in taxes
    - $\frac{\Delta Y}{\Delta T} = -\frac{b}{1-b}$
    - Income is shifted by *b* dollars because disposable income decreases by ΔT but disposable income that goes to consumption is *b* per dollar
    - Implication: If you have/want to increase income, better to increase *G* than reduce *T*.
- An increase in government spending financed with taxes
    - $\frac{\Delta Y}{\Delta G} + \frac{\Delta Y}{\Delta T} = \frac{1}{1-b} + \frac{-b}{1-b} = 1$
    - For government spending to have an effect on income it <u>should not</u> be financed by taxes

FIGURE 5-6 Effect of an Increase in Autonomous Investment on Equilibrium Income



In part a, beginning at equilibrium A, an increase in autonomous investment, from I_0 to I_1, shifts the aggregate expenditure schedule upward from $E_0 = C + I_0 + G_0$ to $E_1 = C + I_1 + G_0$. Equilibrium income increases from point A to point B, $\overline{Y}_0$, to $\overline{Y}_1$. The increase in income is equal to the initial increase in investment (shown as an increase in the intercept), I_0 to I_1, plus an income-induced increase in consumption. This increase in consumption is shown as we move along the higher expenditure function, E_1, from point C to point B. In part *b*, beginning at equilibrium A, the $I + G$ schedule shifts up from $I_0 + G_0$ to $I_1 + G_0$. Equilibrium income increases from point A to point B, $\overline{Y}_0$, to $\overline{Y}_1$.

FIGURE 5-7 Effect of an Increase in Taxes on Equilibrium Income



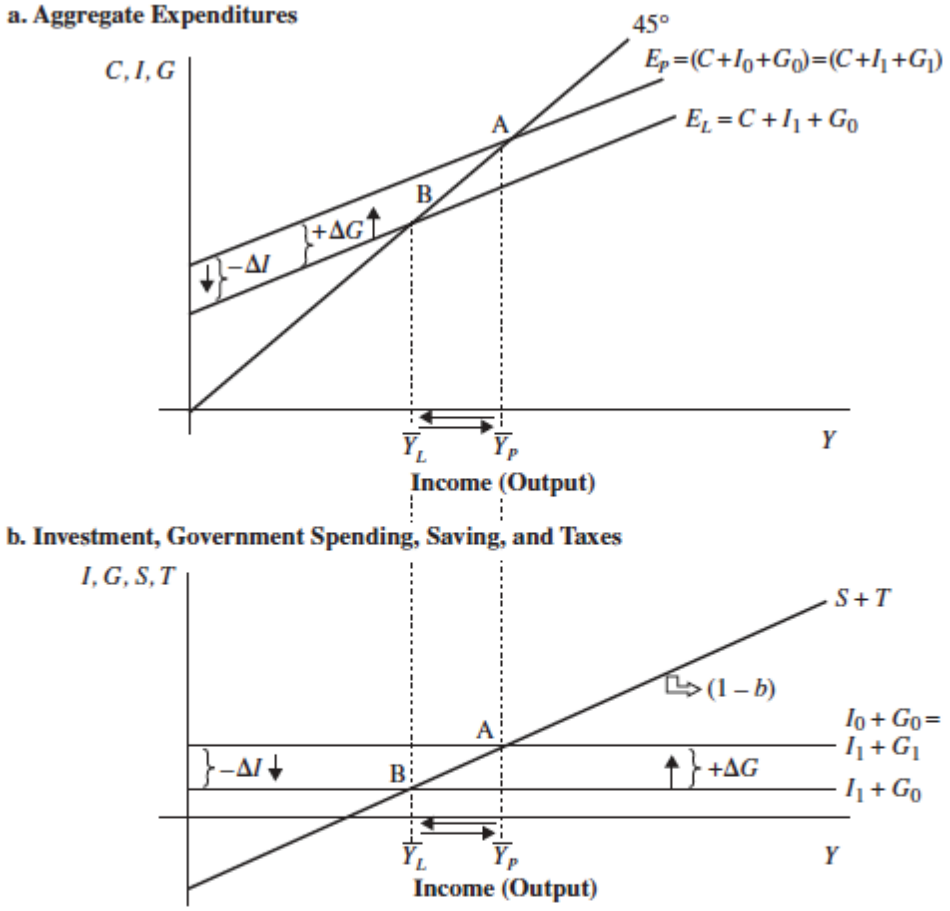
An increase in taxes from T_0 to T_1 shifts the aggregate expenditure schedule downward in part *a*, from $(C + I + G)_0$ to $(C + I + G)_1$ to equilibrium point B, because taxes are in the intercept. Equilibrium income falls from , $\overline{Y}_0$ to $\overline{Y}_1$. In part *b*, starting at equilibrium point A, the saving plus taxes schedule shifts up, from $S + T_0$ to $S + T_1$. Equilibrium moves from A to B.

6. Fiscal Stabilization Policy

- Use *G* so stabilize other volatile and "irrational" (animal spirits) autonomous consumption components (investment)
- Ideally: $\Delta G = \Delta I$
- Be careful: The simple Keynesian model is designed to restore equilibrium, NOT to increase potential output

- Side note (be careful how you read equations):
    - Does $\Delta G \rightarrow \Delta Y$ or does $\Delta Y \rightarrow \Delta G$
    - What is the causal relation?
    - A mathematical formulation takes the causal relation as given. If your theory has the wrong causal relationship you can have a consistent mathematical model with the wrong causal relationship and no sign of the theoretical mistake

FIGURE 5-8 An Example of Fiscal Stabilization Policy



Beginning at equilibrium point A in part *a*, a decline in autonomous investment expenditure from I_0 to I_1 shifts the aggregate expenditure schedule downward from $E_P = (C + I_0 + G_0)$ to $E_L = (C + I_1 + G_0)$, moving to equilibrium point B. A compensating increase in discretionary government spending from G_0 to G_1 shifts the aggregate expenditure schedule back to equilibrium point A, where $(C + I_1 + G_1) = E_P = (C + I_0 + G_0)$. Equilibrium income is again at $\overline{Y}_P$. In part *b*, starting at equilibrium point A, the decline in autonomous investment expenditure shifts the $I + G$ schedule downward, from $I_0 + G_0$ to $I_1 + G_0$, moving to equilibrium point B, decreasing income from $\overline{Y}_P$ to $\overline{Y}_L$. A compensating increase in discretionary government spending from G_0 to G_1 shifts the $I + G$ schedule upward, to $I_1 + G_1$, moving back to equilibrium point A, and increasing income back to $\overline{Y}_P$.

7. Exports and Imports in the Simple Keynesian Model

- Assume now an open economy with exports (X) and imports (Z)
- Then: $Y = E = C + I + G + X - Z$
- Assume not taxes (for simplicity) and that:
    - $C = a + b \cdot Y, \;\; a > 0, \;\; 0 < b < 1$
    - $Z = u + v \cdot Y, \;\; u > 0, \;\; 0 < v < 1$
- $Y = a + b \cdot Y + I + G + X - u - v \cdot Y$
- $Y = \frac{1}{1-b+v}(a + I + G + X - u)$
- Keynesian multiplier in open economies is *smaller* than Keynesian multiplier in close economies
    - $\frac{1}{1-b+v} < \frac{1}{1-b}$
    - Fiscal policy is less effective in economies with large marginal propensity to import