

Introductory Macroeconomics

Lecture 6: Keynesian model of the economy, part one

Bruce Preston & Daeha Cho

1st Semester 2021

This Lecture

- Keynesian macroeconomics, part one
 - determinants of aggregate expenditure
 - role of government expenditure
 - Keynesian cross diagram
- BOFAH chapter 7

Recall the Big Debate

- *Classical* (pre-1930s) business cycle theory
 - Say's Law: '*supply creates its own demand*'
 - markets operate well, interventions counter-productive
- *Keynesian* business cycle theory
 - Say's Law need not prevail *at macro level*
 - * can have economy-wide market failure due to lack of demand
 - * business cycles driven by fluctuations in aggregate demand
 - interventions may be needed, stabilise business cycle fluctuations by stabilising aggregate demand

Keynesian Theory: Main Elements

- Key assumptions
 - prices and wages do not fully adjust in short run ('*sticky prices*')
- Key contributions
 - output can be *demand-determined*
 - importance of expectations, confidence, '*animal spirits*'
- Key implications
 - recessions can be fought by policies that *stimulate demand*

Keynesian Theory: Controversies

- Why don't prices and wages adjust to clear markets?
 - are prices really more difficult to adjust than quantities?
- What determines expectations? Why are expectations so volatile?
- What policy settings best manage fluctuations in demand?
 - fiscal policy? monetary policy?
 - automatic stabilisers vs discretionary stimulus?
 - decision lags vs implementation lags?
parliamentary approval → take time

Keynesian Model of Aggregate Expenditure

- Simple closed economy version \Rightarrow no import. export.

PAE vs AE:

① firm's actual sales are less than expected.

firm's $I > I^P$

② firm sell more of its output than expected?

$I < I^P$

why differ? \Rightarrow since firm are meeting the demand for product and service.

- Let PAE denote planned aggregate expenditure

$$PAE = C + I + G$$

↑ purchase of good
↑ service
↑ consumer durables. eg. cars. computers.
consume invest spend on new capital goods.

↑ public demand \Rightarrow government on goods and services.
eg. government purchases include school, hospital, military hardware and the services of government eg. soldier, police.

Transfer payment
eg. social security payment and unemployment benefits, interest on debt are not included in government purchase

Planned Consumption

- Key building block of Keynesian model

contribute to aggregate expenditure
only when they are spent by recipients

consumption function

- Planned consumption is linear function of disposable income

$$C = \bar{C} + c(Y - T), \quad 0 < c < 1$$

↓ ↓ ↑
induced consumption disposable income income after tax.

wealth effect of changes
in asset prices

where

↑ if people receive extra dollar,
they will spend part.

e.g. a fall in home
prices made consumer
feel poorer, thus less inclined
to spend.

\bar{C} = autonomous consumption (exogenous)

$0 \sim 1$.

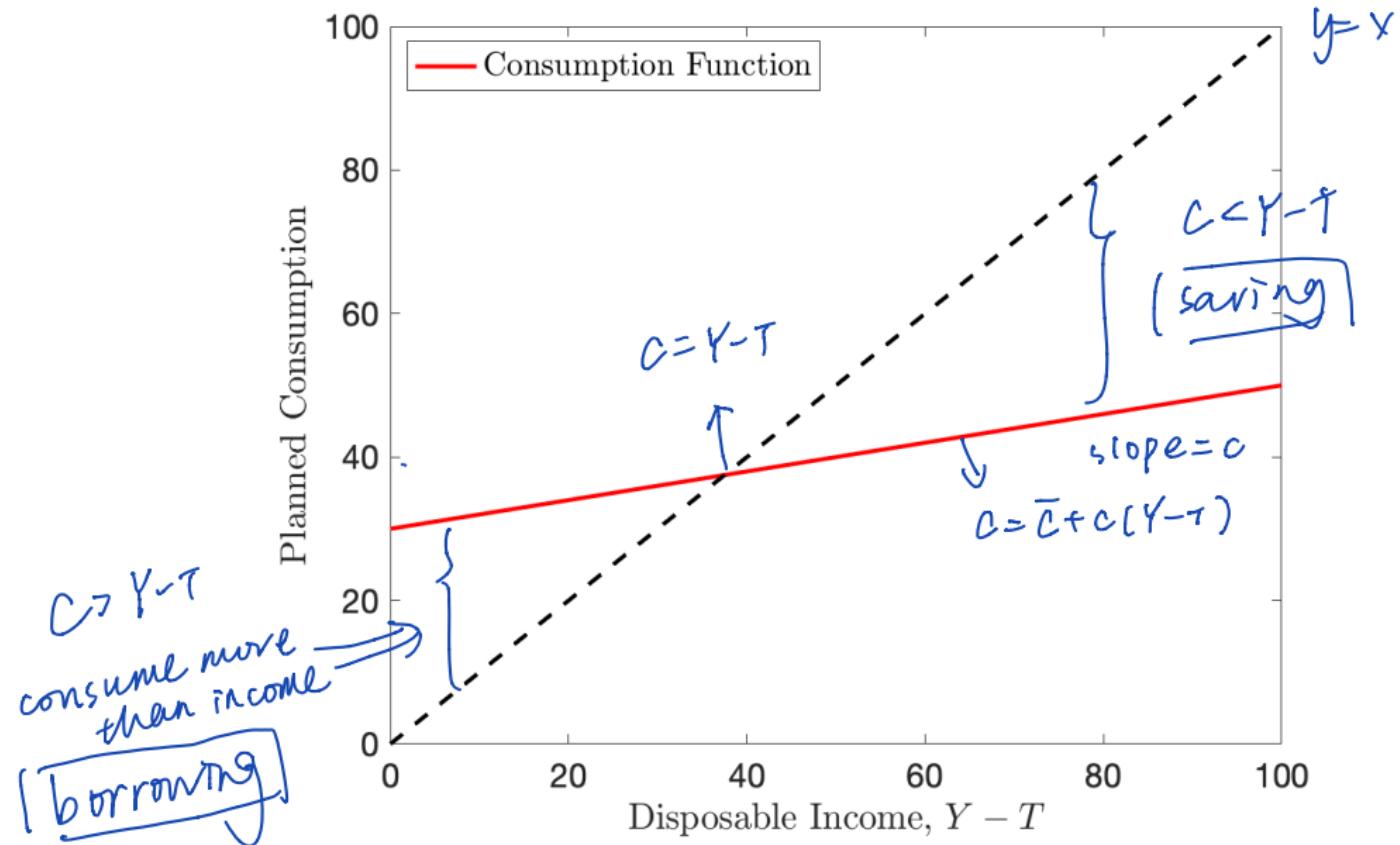
c = marginal propensity to consume

e.g. base level consumption T = aggregate taxes

food, rent

- Planned consumption increases with disposable income, but less than one-for-one

Planned Consumption



Investment

- Planned investment is assumed exogenous

$$I = \bar{I}$$

- Keeps things simple
- Key is that there is *some* component of investment that is independent of income Y , independent of interest rates etc
- Can think of exogenous changes in \bar{I} as ‘animal spirits’

Government

- Government purchases and taxation also exogenous

$$G = \bar{G}$$

$$T = \bar{T}$$

- Again, keeps things simple

government spend less than taxes \rightarrow more revenue
↑

- Government runs a *surplus* if $\bar{G} < \bar{T}$, runs a *deficit* if $\bar{G} > \bar{T}$

↑
must borrow from individual,
in the future it will
repay or interest paying

- Here we abstract from interest payments on pre-existing debt etc

Keynesian Equilibrium Condition

- We now look for an *equilibrium* where planned aggregate expenditure (PAE) equals actual aggregate expenditure (AE)

$$PAE = AE \quad (= Y)$$

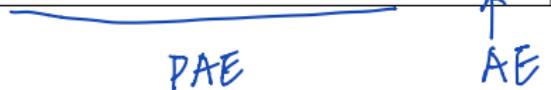
\uparrow
 $C + I + G$

- This will determine a particular level of Y that we refer to as the *Keynesian equilibrium* level of Y
 - $PAE < AE$, surprisingly low demand, unplanned inventory accumulation
 - $PAE > AE$, surprisingly high demand, unplanned inventory draw down
- When $PAE = AE$, planned and actual expenditure consistent

Keynesian Equilibrium

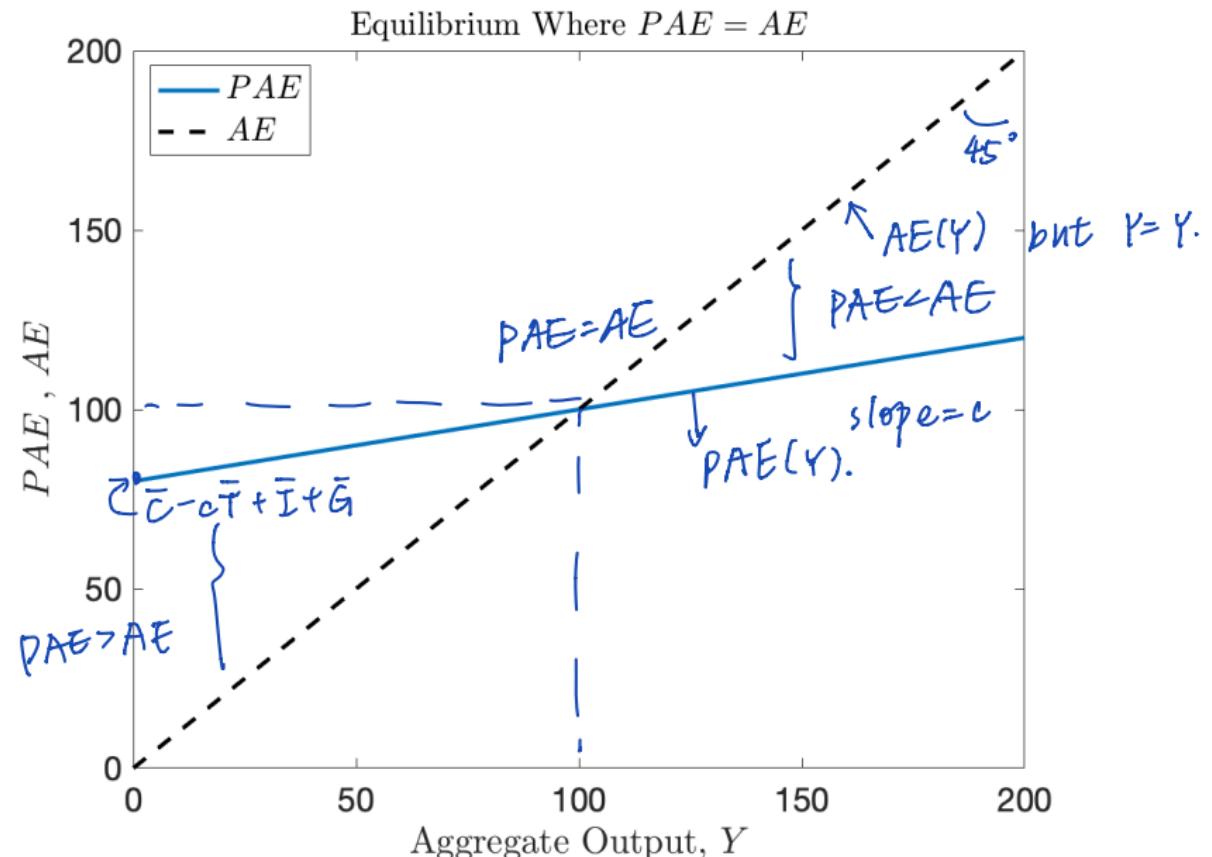
- To find this Keynesian equilibrium level of Y we use the $PAE = AE = Y$ condition to write

$$\bar{C} + c(Y - \bar{T}) + \bar{I} + \bar{G} = Y \quad (*)$$



- This is one equation to be solved for one unknown, Y .

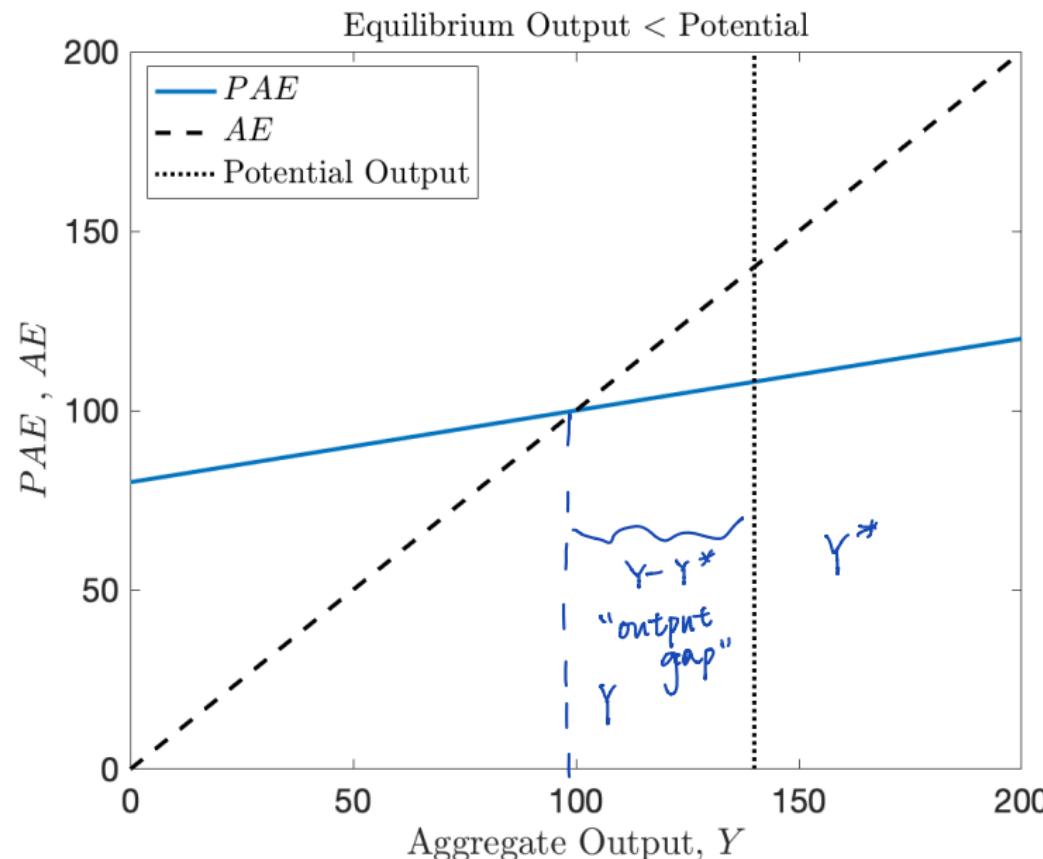
Keynesian Equilibrium



Keynesian Equilibrium

- Key idea here is that economy can get stuck at an equilibrium level of output y^* (below potential output)
 - hence stuck with high unemployment, via Okun's Law
- In this equilibrium, planned and actual expenditure consistent
 - * – (no self-correcting tendency for output to change).
- Keynes viewed this as an explanation for persistent high unemployment during the Great Depression

Keynesian Equilibrium



What Can be Done?

- How can we bring output back to potential?
government purchases
 \uparrow
 \rightarrow increase disposable income
- One idea is to use *fiscal policy* (e.g., increasing \bar{G} or decreasing \bar{T})
for individual to reallocate resources for consumption
- Need to solve for equilibrium Y , see how Y depends on \bar{G} and \bar{T}

Solve for Y

- Write $PAE = AE$ condition in terms of Y

$$Y = \bar{C} + c(Y - \bar{T}) + \bar{I} + \bar{G}$$

- Bring cY to LHS and collect terms

$$(1 - c)Y = \bar{C} - c\bar{T} + \bar{I} + \bar{G}$$

- Divide both sides by $1 - c$ to get

$$Y = \frac{1}{1 - c}(\bar{C} - c\bar{T} + \bar{I} + \bar{G})$$

- Can now see how Y depends on \bar{G} and \bar{T} etc

How Y depends on \bar{G} and \bar{T} etc

- Fiscal policy effects
 - increase in autonomous government spending \bar{G} increases Y
 - increase in autonomous taxation \bar{T} decreases Y
- Other shifts in demand
 - increase in autonomous consumption \bar{C} increases Y
 - increase in autonomous investment \bar{I} increases Y
- What are the *sizes* of these effects?

Government Spending Multiplier

- Take the *derivative* of Y with respect to \bar{G}

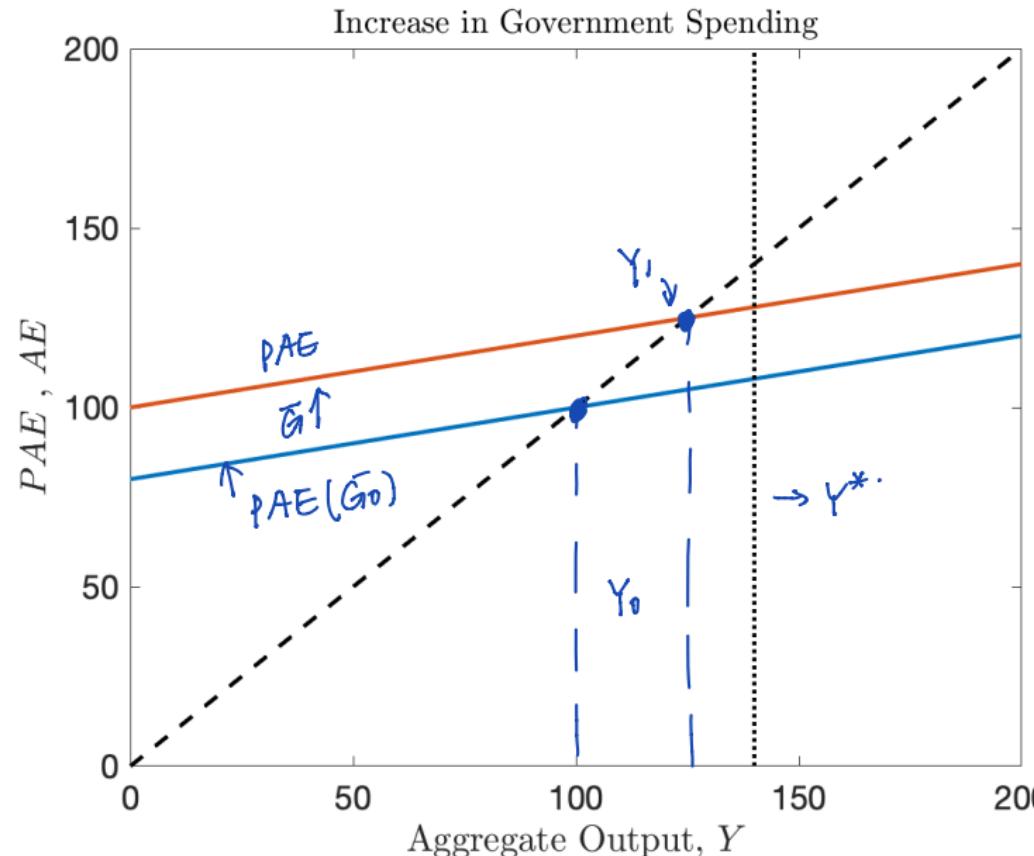
$$\frac{dY}{d\bar{G}} = \frac{1}{1 - c} > 1 \quad (\text{since } 0 < c < 1)$$

- An increase in \bar{G} increases Y by *more than one-for-one*
- This is known as the *(multiplier effect)* \Rightarrow **amplify**
- **Example:** if $c = 0.2$ and \bar{G} increases by \$20 billion then Y increases by

$$dY = \frac{1}{1 - c} d\bar{G} = \frac{1}{1 - 0.2} \times \$20b = 1.25 \times \$20b = \$25b$$

- Amplifies both increases and decreases in autonomous expenditure

Increase in Government Spending



Government Spending Multiplier

- Intuition for multiplier effect:
- Increase in government expenditure has *direct effect* on income
- Part of this increase in income is itself consumed, which leads to further *indirect effect* on income
- Total effect is greater than direct effect. How much more depends on how much of income is consumed
depend on c.

Government Spending Multiplier

- Mathematical details:
- \$1 increase in \bar{G} has \$1 *direct effect* on Y
individual \rightarrow .
- And \$1 increase in Y increases consumption C by $\$c$ which adds further to the increase in Y
- That $\$c$ increase in Y further increases consumption C by $\$c \times c$ which adds further to the increase in Y
- Direct effect plus all the indirect effects

$$1 + c + c^2 + c^3 + \dots = \frac{1}{1 - c}$$

Balanced-Budget Multiplier

- Suppose we finance increase in government spending \bar{G} with increase in taxes \bar{T} , to keep budget deficit/surplus unchanged
- Total effect on output

$$dY = \frac{1}{1-c}d\bar{G} - \frac{c}{1-c}d\bar{T}$$

- If new spending fully paid for, $d\bar{G} = d\bar{T}$, so

$$dY = \frac{1}{1-c}d\bar{G} - \frac{c}{1-c}d\bar{G} = d\bar{G}$$

- charge in taxes eliminate the indirect effect of
government spending*
- In this case, simple one-for-one increase in Y — indirect effects undone by increase in taxation to fund increasing in spending

Next Lecture

- Keynesian macroeconomics, part two
 - savings and investment
 - paradox of thrift
 - more on taxes
- BOFAH chapter 7