

20th Class

3/21/11

mention number of articles on calculating economic impact of Japan disaster; we'll refer to this issue more as we develop our model of the economy

mention last week's announcement of the February inflation rate

<http://www.bls.gov/news.release/cpi.nr0.htm>

annual rate of 2.1% over previous 12 months; note effects of mideast disruption in gas prices

recall our simple model from last time

We'll start with a very simple model in which there is no government yet and no interaction with other countries, so a closed economy model

In this model aggregate demand will just have two components, consumption and investment

$$AD = C + I$$

just as with an individual, the total amount that we spend has to equal our income Y

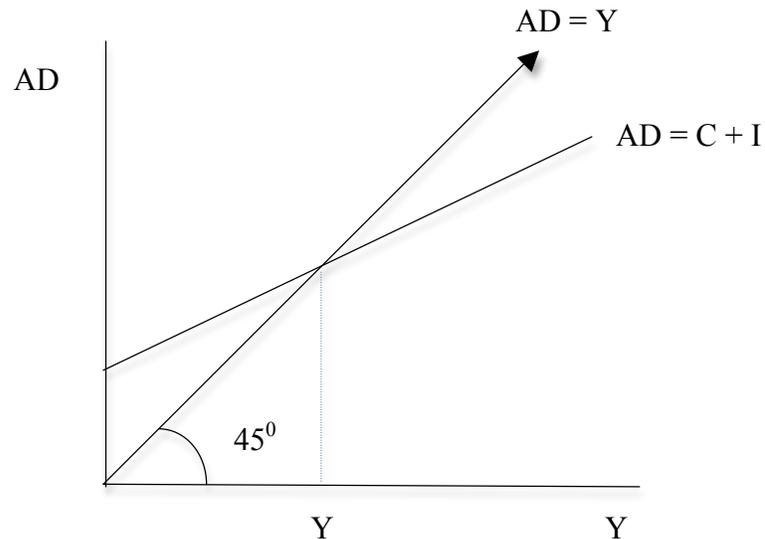
so in equilibrium $Y = AD$, so $Y = C + I$

that might seem really obvious, but recall that the people making consumption decisions are different from the firms making investment decisions, so how do the two sets of agents coordinate?

basically in our simplest model, C will need to be a function of Y to adjust, though it can also be the case that I is a function of Y

Thus the levels of Y and C will adjust mutually to achieve equilibrium.

In general C will be an increasing function of Y (and I can be as well) and thus can be represented as:



And there will be a unique pair of values for C and Y that will solve this system and represent the intersection of the AD function with the 45-degree line.

this diagram is also known as the Keynesian cross

another way to think of aggregate demand is as planned expenditure; in equilibrium planned expenditure $AD =$ actual expenditure/output Y (where output is GDP, and $Y =$ GDP)

What is the mechanism that moves the two together?

At points to the right of equilibrium, $Y > AD$ – can measure them both on the Y -axis—and firms will find themselves running up inventory, so they lay off workers and shut down production until inventory adjusts

At points to the left of equilibrium, $Y < AD$ and inventory is going off the shelves so firms ramp up production and hire more workers

note that for individuals, consumption (C) + savings (S) adds up to income Y

$$C + S = Y$$

so it must be the case that $C + S = C + I$

and thus that $S = I$

thus whatever determines consumption also determines savings through the adding-up constraint

we might consider consumption as having a base amount plus a given amount out of income:

$$C = C_0 + C_1 Y; C_0 > 0, 0 < C_1 < 1$$

so $dC/dY = C_1$

and we call this the marginal propensity to consume, or mpc

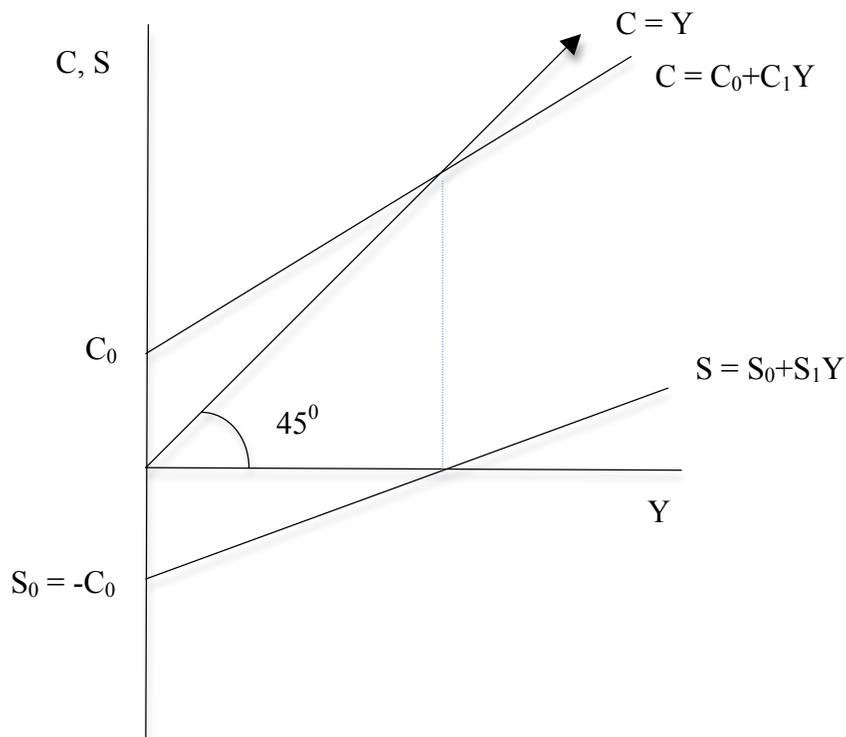
(and $C/Y =$ average propensity to consume, or apc)

note that there must also be a savings function:

$$S = S_0 + S_1 Y; S_0 < 0, 0 < S_1 < 1$$

and similarly $dS/dY = S_1$ and is called the marginal propensity to save, or mps

indeed S_0 must = $-C_0$ and $mpc + mps = 1$



let's solve our simple system algebraically for Y:

$$Y = C + I$$

$$C = C_0 + C_1 Y$$

$I = I_0$, some constant (determined by firms)

substituting into the first equation: $Y = C_0 + C_1 Y + I_0$

$$\text{so } Y(1 - C_1) = C_0 + I_0$$

$$\text{and } Y = \frac{1}{1 - C_1} \cdot (C_0 + I_0)$$

where the first term, $\frac{1}{1 - C_1}$, is the multiplier

so in this simple model, the multiplier is equal to $\frac{1}{1 - \text{mpc}}$

let's do a simple numerical example:

$$C = 10 + .80Y, I = 50$$

$$\text{so } Y = \frac{1}{1-.8} (10 + 50) = \frac{1}{.2} (60) = 5*60 = 300; C = 250$$

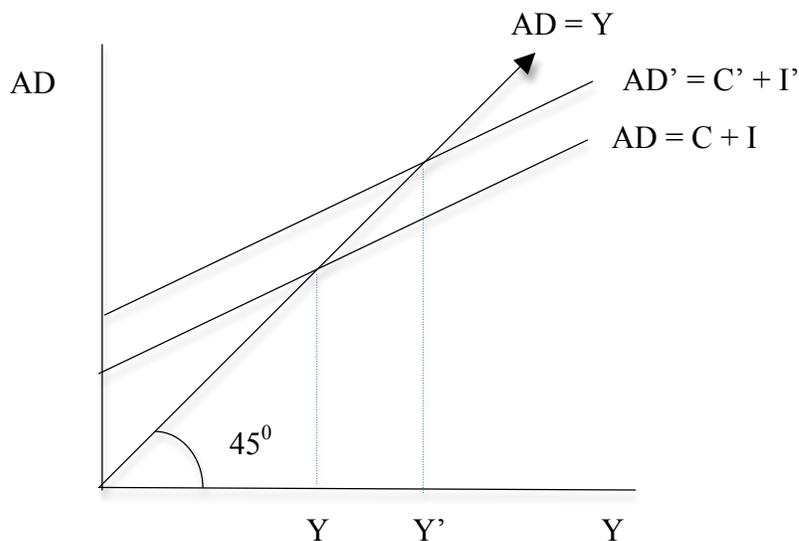
this says that any increase in either base-level consumption or investment will cause income to increase five-fold (and consumption to increase as well)

e.g. what if investment goes up by 10, so $I' = 60$?

$$\text{then } dY/dI = 5, \text{ so } dY = 5*dI = 5*10 = 50; Y' = 350, C' = 290$$

how does this happen?

The initial infusion into AD is literally multiplied up through rounds of expenditure this is why really any source of spending increase will stimulate the economy



note that increases in baseline spending C_0 will also stimulate the economy

another way in which Y can increase is if the multiplier increases
in this simple model, the way that happens is for mpc to get larger

note that is the same as if mps gets smaller
so being less thrifty is good for the economy!

let's consider what happens if instead people get thriftier

e.g. what if mpc drops to $.75$

then multiplier becomes 4 and economy contracts down to 240 , C drops to 190 !

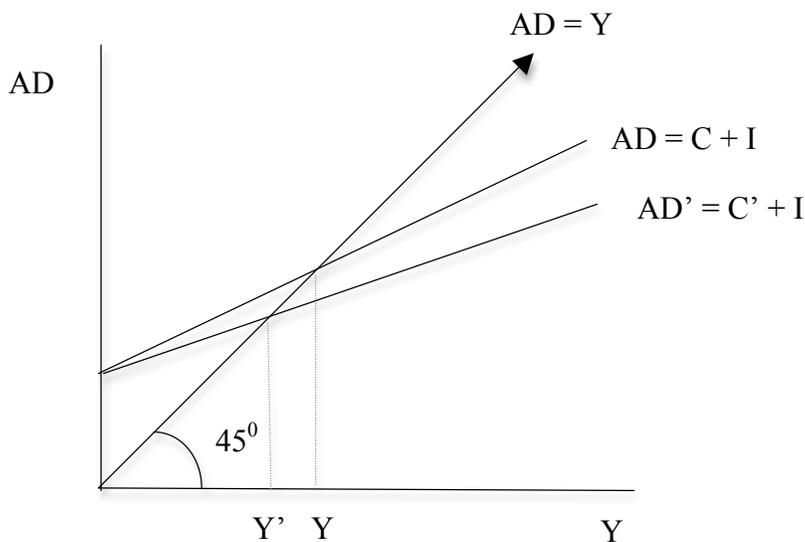
how did this happen?

note that savings are the same as before in total, namely $S = 50 (= I)$

since I doesn't adjust, C has to adjust down to reach the new higher savings ratio!

so even though everyone wants to save more, all they end up doing is contracting the economy
and saving the same amount as before but consuming less!

this is the paradox of thrift in action



Practice Problems 3/21/11

I. An economy can be characterized by the following three equations:

Consumption function: $C = 100 + .75Y$

Investment: $I = 50$

Equilibrium: $Y = C + I$

- 1) Solve for the equilibrium values of Y and C.
- 2) What is the multiplier?
- 3) Draw the 45-degree diagram and show this point on your diagram.

II. Suppose investment rises:

$$I' = 60$$

- 1) Now what are the equilibrium values of Y and C? Note you can solve for this either by using the multiplier directly, or by resolving the system of equations. Try doing it both ways.
- 2) Mark this new point on your diagram.