

LECTURE 28: LONG-RUN AGGREGATE SUPPLY

I. On Income

- a. One of the strongest relationships in macroeconomics is the relationship between disposable income (DI) and consumption (C). The more you make, the more you spend. There is a positive correlation between the two.
 - i. *Disposable income* is income after taxes.
- b. *Savings* (S), or anything that's not spending, is also positively correlated with disposable income. It becomes investment.
 - i. Or, $S = DI - C$
- c. *Marginal propensity to consume* (MPC) describes what portion of an additional amount of income goes to consumption. It ranges from zero to one (but sometimes more).

$$\text{marginal propensity to consume} = \frac{\Delta C}{\Delta DI}$$

- i. Typically people with a low income have a high MPC. MPC decreases as income rises. The same is true for whole economies. But for simplicity, we will be assuming MPC is constant.
- d. *Marginal propensity to save* (MPS) describes what portion of an additional amount of income goes to saving. Ranging from zero to one.

$$\text{marginal propensity to save} = \frac{\Delta S}{\Delta DI}$$

- i. Since you can either save or spend your income,

$$MPS + MPC = 1$$

II. The Keynesian (or Fiscal) Multiplier

- a. Suppose I give you \$1. What could you do with it?
 - i. Some of it you will save, some of it you will spend.
 - ii. The portion you spend will be added to someone else's income.
 - iii. This additional income will be partly spent as well, adding to someone else's income.
 - iv. And so on...
- b. All these individual transactions, added together, increase GDP and it increases it by more than the initial \$1 I gave you. We call this the

Keynesian Multiplier, after John Maynard Keynes, the father of macroeconomics.

$$\text{Keynesian Multiplier} = \frac{\text{change in real GDP}}{\text{initial change in spending}}$$

- i. How much more depends on the MPC.
- ii. If $MPC = 0.9$, GDP increases by $\$1 + \$0.90 + \$0.81 + \$0.73 + \dots$
- iii. If $MPC = 0.8$, GDP increases by $\$1 + \$0.80 + \$0.64 + \$0.51 + \dots$
- iv. This infinite series converges such that total multiplier equals

$$\text{Keynesian Multiplier} = \frac{1}{1 - MPC} = \frac{1}{MPS}$$

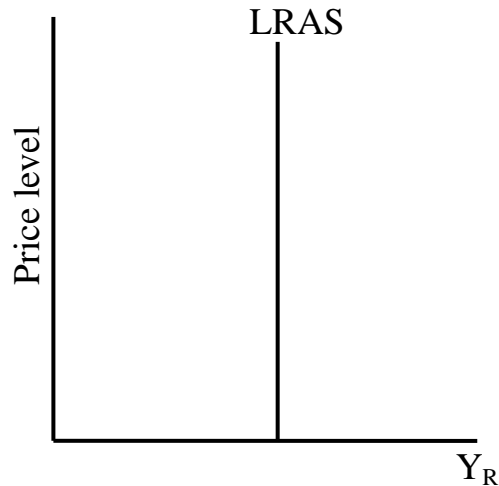
- v. So a 0.9 MPC is a multiplier of 10; at 0.8, the multiplier is 5.
- c. Economists estimate the actual multiplier is much lower than what we predict here. This equation gives us an upper bound. The actual value (somewhere between zero and 2.5) is lower because...
 - i. New income is dissipated in the form of taxes and imports.
 - ii. Inflation from extra spending reduces the real GDP gains.
 - iii. Savings becomes investment, which is also spent but on different things. This process takes longer than spending, but it does decay the spending gains thanks to opportunity cost.
 - iv. The equation derives from an infinite series, but it can take a long time for money to change hands that often! In practice, it might only change hands a few times before the year runs out. On the other hand such spending *will* increase real GDP; it's just a matter of time.

III. The Axes

- a. We begin with something that looks a bit familiar. We have something like “price” on the y-axis and something like “quantity” on the x-axis.
- b. This is the beginning of our aggregate (total) model.
 - i. Thus y-axis is the *price level*: all prices. Note this isn't the same thing as inflation. Inflation is a rate; inflation describes how the price level is changing. It's like the difference between velocity and distance traveled.
 - ii. Similarly, the x-axis is *real GDP*: all quantities. It is the total output of the entire economy.

IV. The Shape of Things

- a. The Long-Run Aggregate Supply Curve captures the fundamentals of an economy. As such, it is a vertical line: the real GDP is \$50 billion or \$9 trillion. No matter what inflation is.



- i. Recall real growth rates are *adjusted* for inflation. If prices double, GDP should double. But GDP adjusted for inflation should be the same.
- ii. One of the most fundamental assumptions of the LRAS is that wages and prices are completely flexible—that’s what the “long-run” means.
- iii. Thus higher prices don’t induce higher output. Why should it? If the price level increases, input prices (including materials and labor) also increased.
- iv. This also means we’re at full-employment at the LRAS. If equilibrium output didn’t match full-employment, wages would adjust so the only unemployment was the natural rate.

V. Shifting LRAS

- a. When LRAS curve shifts, something fundamental just happened in the economy. We call these *real shocks* (because they have a real effect: an effect that’s adjusted for inflation).
 - i. A positive shock increases real GDP. Examples include technology, increases in the capital stock, higher levels of education, and increases in the population.
 - ii. A negative shock decreases real GDP. Examples include disasters and wars (which reduce both the capital stock and the population), and a fall in education levels.