

Week 6 Recitation

Practice Problems

This week we are going to work on the AD/AS model. It is similar to the traditional supply and demand model you learned on ECON202 – Principles of Microeconomics (and that’s why we reviewed it in the first week of class!), but there’s a fundamental difference: here we are considering the whole economy instead of just homogeneous firms within a sector, selling to representative households. Therefore, we are talking about Aggregate Demand and Aggregate Supply, and we are interested in understanding how they interact in the short and in the long-run, and what are the impacts of those dynamics for growth, employment, and inflation.

1. Draw the AD/AS model. Your graph must clearly show: the label of the X-axis, the label of the Y-axis, the (Short Run) Aggregate Supply curve with the appropriate slope, the Aggregate Demand curve with the appropriate slope, and the Long Run Aggregate Supply (or Potential GDP) curve with the appropriate slope.

For the X-axis, the students should understand that we use Real GDP (instead of nominal GDP), because we want to be able to compare GDP across time at different price levels.

For the Y-axis, we use price index (e.g., GDP deflator), because we are interested in the average price of all final products in an economy and how that increases/decreases. Therefore, the price level is a GDP deflator, and not the inflation rate (which, as we discussed in previous weeks, is the variation of the price level over time).

The aggregate supply curve shows the changes in GDP at different price levels for final goods, assuming that intermediate goods (inputs) prices are constant. The slope is positive because, since inputs cost the same, the producers will offer more products when the price they are getting for them is higher. To explain the slope of the AS curve, it is useful to draw the Potential GDP line first. Since the potential GDP curve shows how much an economy can produce if it’s running at full capacity, when the producers as a group are far away from that line, it’s cheap for them to increase their production (i. e. increase GDP). The closer we get to full capacity, the more expensive it gets, since they will have to buy more capital, rent a bigger production site, hire more expensive workers, etc. As a result, the AD curve is flat at the beginning (big increases in real GDP can be achieved without big increases in the price level), and it gets steeper and steeper the closer it gets to the potential GDP line.

The potential GDP line is how much an economy can produce if it’s running at full-capacity. In the long-run, firms will adapt the size of their operations to not run with idle capacity—which would decrease their profits—nor over its limits—since workers can’t do extra hours forever and machines increase their depreciation rates if overused. Therefore, the potential GDP curve is perfectly vertical and is also called Long-Run Aggregate Supply (LRAS), making the “Aggregate Supply” curve really the Short-Run Aggregate Supply (SRAS).

Finally, the Aggregate Demand curve is defined by $C + I + G + (X - M)$. The slope is negative because of the: (1) wealth effect, meaning increasing prices of final goods decreases the consumption capacity of households (purchasing power of savings is eroded); (2) interest rate effect, meaning increasing prices of final goods will increase the demand for credit, and higher interest rates decrease both consumption and investment; and (3) foreign price effect, meaning that, if the domestic prices increase and the prices of the rest of the world are held constant, exports tend to decrease and imports tend to increase. Note that those dynamics are all very complicated and a lot of factors come into play (such as expectations and government policies), so the AD curve is generally less elastic (steeper) than the SRAS curve.

2. Where is the equilibrium of your graph? Where is the full-employment point? What does the full-employment point tell us about cyclical unemployment and natural unemployment?

The equilibrium is where the SRAS meets the AD curve, and the full-employment point is the LRAS curve. If the equilibrium occurs in the flat range of SRAS, then the economy is not close to potential GDP and will be experiencing high unemployment, but stable price level. If equilibrium occurs in the steep range of LRAS, then the economy is close or at potential GDP and will be at the verge of experiencing rising price levels or inflationary pressures but will have a low unemployment rate. May be a good idea to draw a second graph here to illustrate this difference.

The potential GDP line assumes that the economy is operating at full capacity, meaning at the natural rate of unemployment (i.e., the unemployment that arises from political, cultural, and social factors in general). So, at the full-employment point, cyclical unemployment (i.e., unemployment originated by recessions and expansions in the economy) is zero, but that tells us nothing about the natural unemployment rate, that can be quite high. For the US economy, when the unemployment rate is close to 4%, a number of economists claim that the country is at the full-employment point, since they consider that the natural unemployment rate.

3. Suppose that the workers of this economy came up with a new organizational method that increased their productivity considerably and can be applied in a vast variety of different industries, impacting the whole economy. Does that shift the SRAS, LRAS, or AD? To which side? What are the impacts on prices, real GDP, and unemployment, if any?

Such a productivity increase will shift the SRAS curve to the right, as now businesses can produce more with the same inputs, meaning they are willing to produce more products (increase GDP) at every price level. Since at full-employment the economy can produce more with the same inputs (higher GDP), the LRAS will shift to the right too. The AD curve stays the same.

The price level decreases, while real GDP increases, but we can't really measure the impact on unemployment: depending on the shape of the SRAS and the AD curve, the distance between E_0 and $LRAS_0$ can be greater, smaller or the same as the distance between E_1 and $LRAS_1$.

4. Now assume that, due to pressure from the business owners, all wages decrease in real terms, decreasing the purchasing power of the population. What will happen to the AD curve? If we assume the SRAS and LRAS curves stay fixed, what will be the impact on the price level, real GDP, and unemployment?

Such a decrease in wages would decrease aggregate consumption, which is a component of demand ($C + I + G + X - M$). This would shift the AD curve to the left, decreasing the price level, decreasing Real GDP and increasing the unemployment, since the equilibrium is further away from the LRAS (recession).

5. In Exercise 4, we assumed that the SRAS and the LRAS were constant, because we were interested in studying the impact on AD. However, since workers are an input for production, a decrease in wages represents cheaper inputs. How does that impact the SRAS? And the LRAS? Do you believe that the impact would be greater on AD or SRAS? How does that relate with the Keynesian zone, the intermediate zone, and the neoclassical zone of the AD/AS model?

Cheaper production inputs would shift the SRAS to the right, which (holding AD fixed) decreases prices and increases GDP (similar to Exercise 3). However, since a decrease in input prices is, in general, a short-run fluctuation, we assume that the LRAS would not shift (so we know cyclical unemployment would fall – again holding AD fixed). But labor is a very specific input: we are talking about people, not apples or

machines. Lower wages may decrease workers' incentive to be productive, which would make the shift of the SRAS be very small or even nonexistent (a decrease in productivity would shift the LRAS to the left too). Moreover, if the decrease in consumption is too great, it might more than compensate the shift of the SRAS.

So ultimately, the short run effect on output and unemployment is unclear. It is hard to predict what impact such cut on wages would have in the economy. If we believe that the economy is at the Keynesian zone, because the SRAS is flat, that decrease in wages is more likely to generate a worse recession. The closer to the neoclassical zone, the more likely the benefits of the supply-side are to offset the effects of the demand-side.

It might also be useful to remember our concept of unemployment: to be unemployed someone must be looking for work, and small wages discourage workers to look for jobs. Smaller wages thus tend to decrease the labor force participation rate, which decreases the total earned wages in the economy, further decreasing consumption and aggregate demand. Depending on how much time you have for this discussion, you can even debate how that would increase government's transfers, due to unemployment benefits, which can decrease government's consumption and further shift the AD to the left. (The students saw some graphs about labor force participation and employment in a discussion post a few weeks ago).

6. Using the AD/AS model, how would each of the following most directly affect output, prices, and unemployment?
 - a. Personal income tax increase
 - i. Shift AD curve left (lower consumption)
 - ii. Lower output, lower prices, higher unemployment
 - b. Corporate tax cut
 - i. Shift AD curve right (higher investment)
 - ii. Higher output, higher prices, lower unemployment
 - iii. Note: in long-run could also increase productivity and shift supply curves
 - c. Increased environmental regulations
 - i. Shift SRAS curve left
 - ii. Lower output, higher prices, higher unemployment
 - iii. Note: in long-run could change productivity
 - d. Covid relief payments to most households
 - i. Shift AD curve right (higher consumption)
 - ii. Higher output, higher prices, lower unemployment
 - e. Spike in international sugar prices due to foreign drought
 - i. Shift SRAS curve left

- ii. Lower output, higher prices, higher unemployment
- f. Increase government spending on infrastructure (e.g., roads and bridges)
 - i. Shift AD curve right (higher government spending)
 - ii. Higher output, higher prices, lower unemployment
- g. Expanded child tax Expanded Child Tax Credit for parents
 - i. Shift AD curve right (higher consumption)
 - ii. Higher output, higher prices, lower unemployment