

Short Run Aggregate Supply

Some prices change quickly, other change slowly. Some prices are set by contracts. Examples – your apartment lease, most people’s salary, etc. Stock prices change from second to second. The price of the Greenville News rarely ever changes. We call prices that are slow to adjust “sticky prices”. It turns out it seems that input prices are “sticky”.

Once input prices are sticky, unanticipated changes in aggregate demand can have a real effect, i.e. real GDP to change.

For simplicity, we will make an extreme assumption. We will assume that all input prices are fixed (contractually) in the short run.

How long is the short run? I don’t know, it depends. We refer to the long run as the amount of time it takes for all prices to adjust. Thus, prices are not sticky in the long run. You can think of the short run as the period of incomplete adjustment.

An example of the story, then the model

Suppose you are running a pizza store. You use the following inputs to make pizza: Cheese, sausage, labor, and rent. Output, is of course, pizza.

You have signed a one-year lease, and thus your rent is set at \$400 a month. All of your employees have agreed to work at \$5.50 an hour for the year. Your cheese and sausage supplier has stated that he will allow you to buy as much cheese and sausage at the given price during the course of the year.

Now, suddenly there is a big increase in the money supply (an increase in aggregate demand). For a moment, imagine that Alan Greenspan drops money from a helicopter to all the people below. People pick up the money.

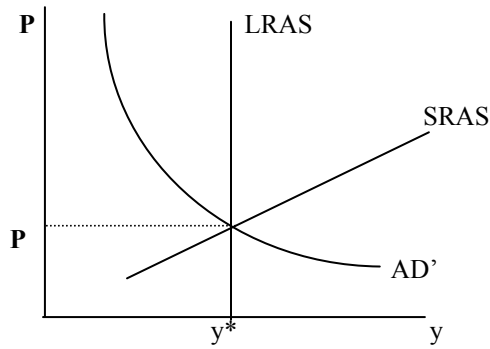
Remember what a person’s money demand function suggests. It says that for a given level of income, I want to hold x amount of money. Suddenly they pick up the money outside and they are holding “too much money” for their level of income. People have a desire to get rid of some of this excess money. How? They can burn it. More than likely, they’ll go out and spend it. This is an increase in aggregate demand.

People have more money than they want to have, so they go out and spend it. All this money causes goods the prices of goods to rise, including your pizzas. You find that people are willing to pay \$12 instead of \$10. However, the inputs you use haven’t changed in price (your MC hasn’t changed). You can still make the same pizza at the same cost (your rent hasn’t changed, you still pay your workers the same, etc.), but can sell the pizza for more money. What do you do? Make more pizzas. Have people work overtime. Hire more workers, etc. Work the oven overtime. Stay open later.

However, this can’t last forever. We know in the long run, changes in aggregate demand don’t effect real GDP. After a while, your workers get tired of working 60 hrs/week. They see the prices of pizzas (and presumably CD, cars, etc) are all rising and realize their real wage is falling. They demand a wage increase. This increases your costs. The cheese supplier sees what is going on, and charges you a higher price for cheese. Eventually, your lease comes up, and the landlord raises the rent. Eventually, your input prices catch up with the increase in the price of your output.

For the economy as a whole, production (real GDP) is limited by population, capital, and technology. None of these things have changed. While in the short run (temporarily) the economy can boost production, in the long run, the economy must return back to y^* . In the short run people are working overtime, more than they want. They will get tired of this. Extra people are in the labor force. In the short run - machines will be over-used and under-maintained and break down. This pace can’t be maintained in the long run.

The story I have been telling is to justify the Short Run Aggregate Supply curve (SRAS). It shows us the economy wide response to a change in price level in the short run. The SRAS curve is upward sloping, as described above. As the price level increased, real GDP increased.



Associated with any long run equilibrium, there will be also be a short run aggregate supply curve (SRAS) showing the short run response.

When we do comparative statics, we'll start of at a spot where where the economy is in equilibrium in the long run and in the short run. Look at the picture above.

Comparative Statics - Increase in AD

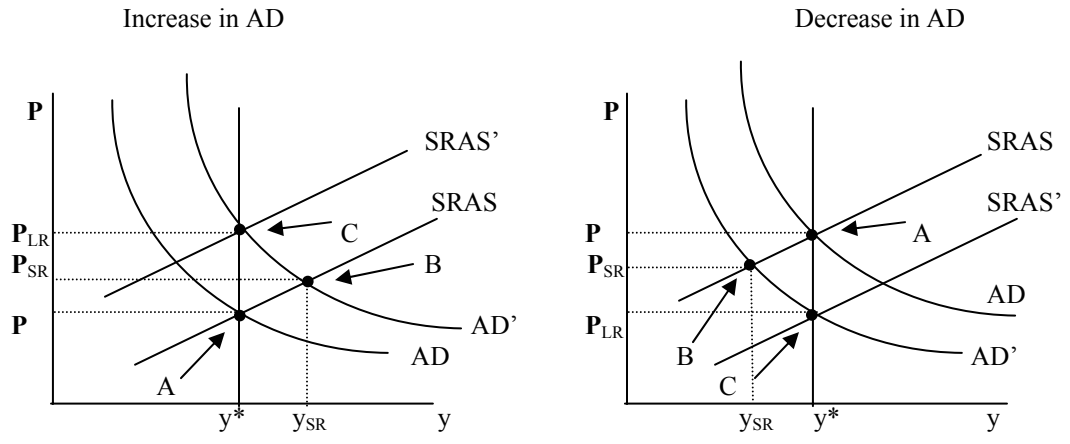
Consider a rise in AD to AD'. In the LR, the economy will go to point C. Eventually, the price level will rise to P_{LR} . We know this much from before.

In the short run, because input prices are fixed, price rises to P_{SR} , a smaller increase in price than will be seen in the long run. In the SR, some prices adjust a lot, some adjust a little.

At point B, output is temporarily above the steady state (more overtime, more people in LF, working more than they want to in the LR, overworking machines, etc). Symbolically, $y > y^*$. Unemployment falls, below the natural rate ($U < U^*$). This is negative cyclical unemployment, a boom.

As the contracts get renegotiated, SRAS shifts up. Each input price increase causes another SRAS shift to the left. Eventually, the SRAS will shift up until it goes through point C.

Thus, as we go from the SR to the LR, there is a further rise in the price level, output falls back from y_{SR} to y^* .



Thus, the economy takes the path from A to B then to C.

SR effect: $P \uparrow, y \uparrow$ (increase in prices, and increase in real GDP, decrease in U)
LR effect: $P \uparrow \uparrow, y$ remains at y^* (prices continues to rise, but y falls back to y^*)

A bit on the jargon. When I ask you on the test for the short run effect, I am asking you to describe what has happened as we move from point A (initial equilibrium) to the new SR equilibrium (point B). Thus, in the above example, you would tell me that the price level had increased, and real GDP had increased.

When I ask you on the test for the long run effect, I am asking you to describe what has happened as we moved from point A (initial equilibrium) to the new LR equilibrium (point C). Thus, in the above example, you would tell me that the price level has increased, and real GDP remains unchanged.

If I wanted to ask you about what had happened as we moved from point B (the new SR equilibrium) to point C (the new LR equilibrium), this would be called the “transition period”. We won’t spend a lot of time on this. In the above example, during the transition period, we would observe rising prices and falling real GDP.

Decrease in AD

The process is similar for a decrease in aggregate demand. We start at LR equilibrium at y^* and P at point A. In the short run, the decrease in aggregate demand causes a decrease in price to P_{SR} and a decrease in quantity to y_{SR} (point B). Here $y < y^*$ and $U > U^*$. This is cyclical unemployment, a recession. As prices adjust, the SRAS curves shifts to the right until it reaches the new LR equilibrium of point C, where the price level is P_C and output has returned to the steady state level, y^* .

Thus, the economy takes the path from A to B then to C.

SR effect: $P \downarrow, y \downarrow$ (a fall in prices, and decrease in real GDP, increase in U)
LR effect: $P \downarrow \downarrow, y$ remains at y^* (prices continue to fall, but y rises back to y^*)

The punchline, and the difference between unanticipated changes in AD vs. anticipated changes

In the short run, unexpected changes in Aggregate Demand can have “real effects” on the economy. For example, an unexpected change in the money supply will increase aggregate demand. In the short run, the price level will rise and real GDP will increase (a boom). However, in the long run, all we will end up with is a (larger) increase in the price level and real GDP back to y^* .

Part of the SRAS story is that people were fooled. Input prices were fixed. There was a bit of time where the pizza storeowner didn’t know that the price of pizza was rising just like all output prices were rising. It took a while for the workers at the store to realize their real wage was falling (since the price level was rising). Once people figure out that there has been an increase in aggregate demand, they know that eventually all that will result is an increase in the price level.

This is why I said that unanticipated changes in aggregate demand can increase real GDP. Consider the alternative. Suppose that the Fed announces it will be doubling the money supply next month. Everyone knows that the Fed will increase the money supply and there will be an increase in aggregate demand. In this case, the contracts that involve input prices can be adjusted. The cheese guy tells you the price of cheese is \$5/lb this month, but next month it’s increasing to \$5.50. Maybe even your landlord tells you the price of the building is increasing next month. The workers will demand that their wage increase next month.

Instead of a slow process of prices being re-negotiated and slowly shifting the SRAS curves up to the LR equilibrium, you’ll get a very rapid big shift in SRAS up to point C. Everyone knows that price levels will increase. We wouldn’t expect to see an increase in real GDP as a result of this change. In a nutshell, anticipated changes in AD will go right to the new long run equilibrium.

Just a bit on real wages

Real wages are nominal wages adjusted for changes in the price level

$$w = W / P$$

w = real wage

W = nominal wage

P = price level

Suppose initially your nominal wage is \$5.25 / hour. The price level is 1. Your real wage is \$5.25 / hour.

Now, after an increase in AD, the price level rises to 1.2. Your real wage is now only \$4.38 / hour. Your real wage has fallen. Or stated differently, your nominal wage of \$5.25 / hour now buys fewer goods than it used to.

$$w = W / P = \$5.25 / 1$$

$$w = W / P = \$5.25 / 1.20 = \$4.38$$

Go back and check the story about the SRAS curve on page 1 of these notes and make sure you understand why workers demand a pay raise after they start seeing the price of all the goods in the economy rise. What is happening to their real wage?

And on that note, does getting a raise each year necessarily mean your employer thinks you're a better employee?