

Aggregate Supply and Demand Analysis

Chris Ball

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Abstract

This material is intended as review for people who took a macroeconomics course and learned aggregate supply and demand (AS-AD) analysis, but need a review. I also show it to you the way I like to think about and use it.

1 Price level - real output space

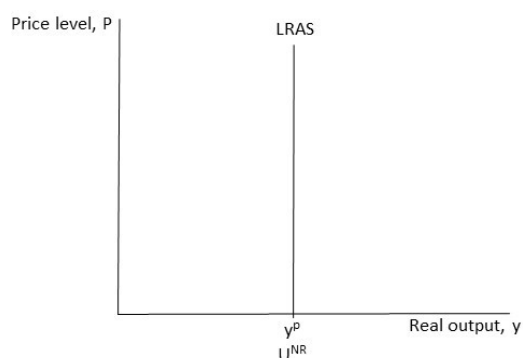
We graph the AS-AD diagram in price level-real output space. It's important to understand that the price level is the aggregate of all prices in the economy. It isn't just the price of a single good or service. You can think of it as "all prices". And we put the price level on the y-axis.

The x-axis then has real output, or real GDP. That is the real quantity of all goods and services sold in the economy. Since real GDP going up or down is generally correlated with employment going up or down, we can also keep track of what should be happening to unemployment. That is, if real GDP increases, we can safely assume unemployment decreases. If real GDP decreases, we can safely assume unemployment increases. Those are generally safe assumptions, especially once we identify our long-run level of potential real GDP which is also known as the full-employment level of output or output when unemployment is at its natural rate.

2 The long-run aggregate supply curve, LRAS

The long-run supply curve really acts like an anchor in this model. It comes from long-run growth theory. Really it is the marker on the graph where output is at its long-run, full-employment level. This is also called "potential output" and it is what an economy would produce if all its resources were optimally employed.

Also, the long-run potential output of an economy is determined by fundamental, real things. In particular it depends on land, labor, capital and technology. To see how all those things interact to generate long-run output in a growing economy, you should learn about Economic Growth Theory. For now, suffice it to say they are all real variables determined by fundamental relationships in an economy. It's especially important to realize they are NOT determined by the price level. As a result, the long-run aggregate supply curve, LRAS, is vertical.



Finally, the x-axis is labeled " y^p " for "potential output" and below that is " U^{NR} " to remind us that at this level of output the economy is also at its natural rate of unemployment.

To capture all of this in simple notation, we'll write:

$$LRAS = f(A^+, L^+, K^+)$$

which just says that the LRAS is a function of technology (A), labor (L) and capital (K) (I've ignored land). The little "+" signs represent that these variables are positively related to LRAS. That is, if technology increases, so does LRAS (i.e. it shifts rightward), and so on.

3 The short-run aggregate supply curve, SRAS

The short-run aggregate supply, SRAS, curve looks like a normal supply curve. It is upward sloping. And anything that shifts the LRAS curve will shift SRAS too.

In general, you can think of SRAS as "all the supply curves" of all the firms in the economy. As such, beyond long-run growth factors (i.e., A, L, and K) there is really only one key variable in the SRAS curve that shifts it around. That is the expected price level. The reason is that, once all the households and firms in the economy come to actually believe and expect the price level to rise, workers begin to negotiate higher salaries and a firm's suppliers begin negotiating higher prices for their products (the firm's inputs) and this alone begins to push up the costs of production. You might recall from microeconomic analysis that increasing the costs of production for a firm, shifts the supply curve to the left. When this happens for all firms, then it shifts the economy's aggregate supply curve left as well. Similarly, expecting a decrease in the price level will lead to a rightward shift of the SRAS curve. We capture that in the following simple notation.

$$SRAS = f(\overbrace{LRAS}^+, \overbrace{P^e}^-)$$

where the "+" on LRAS denotes that an increase in any factor increasing LRAS will also increase SRAS and the "-" above the P^e indicates that increasing the expected price level, P^e , will decrease SRAS (i.e., they are inversely, or negatively, related).

4 Aggregate Demand, AD

The aggregate demand, AD, curve looks like a micro demand curve in that it is downward sloping. When you think of what is on the demand-side of the economy in a macroeconomic setting, we think first of the parts of the national income identity, $C + I + G + NX$, where C is consumption, I is investment by firms in capital and equipment, G is the government's expenditures, and NX is net exports (i.e., exports minus imports).

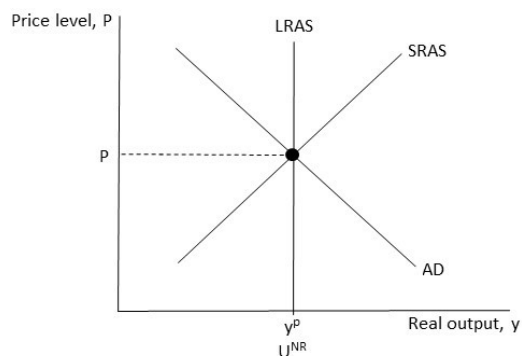
Since we'll also consider policy matters, like changes in taxes on the fiscal side or changes in interest rates on the monetary side, we'll include those variables as factors shifting AD as well, namely, M for the money supply, i for interest rates, and T for taxes. We thus write the following.

$$AD = f(\overbrace{C, I, G, NX, M}^+, \overbrace{i, T}^-)$$

where all the first 5 variables are positively related to AD (i.e., increase any of them and AD increases) and the last two are negatively related to AD (i.e., increase either of them and AD decreases).

5 Putting it all together

An AS-AD diagram looks like a microeconomic supply and demand diagram with a line in the middle. In short, in long-run equilibrium, the SRAS curve crosses the AD curve on the LRAS curve. That's the sense in which the LRAS curve is the anchor. The current price level and real output are determined by where the SRAS and AD curves cross and that can be above or below y^p (i.e., to the right or left of the LRAS curve) but after all the adjusting is done, they must cross on the LRAS curve again. If they don't then something in the economy is still adjusting and your analysis isn't finished. For 90% of the cases, we'll have some shock to the AD curve and then the SRAS curve has to move to get the two curves crossing on the LRAS curve again.



6 AS-AD Analysis

Let's first review all the pieces:

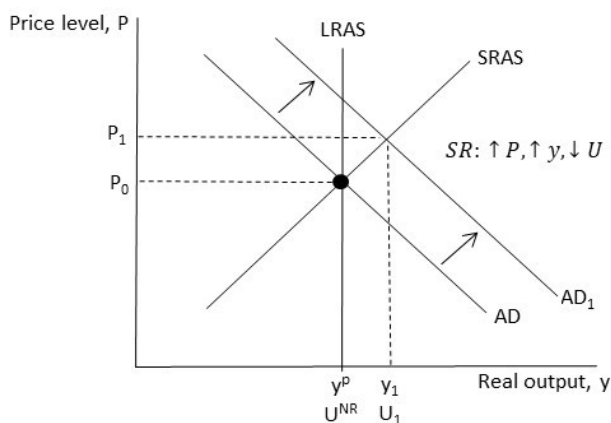
$$LRAS = f(A^+, L^+, K^+)$$

$$SRAS = f(\overbrace{LRAS}^+, \overbrace{P^e}^-)$$

$$AD = f(\overbrace{C, I, G, NX, M}^+, \overbrace{i, T}^-)$$

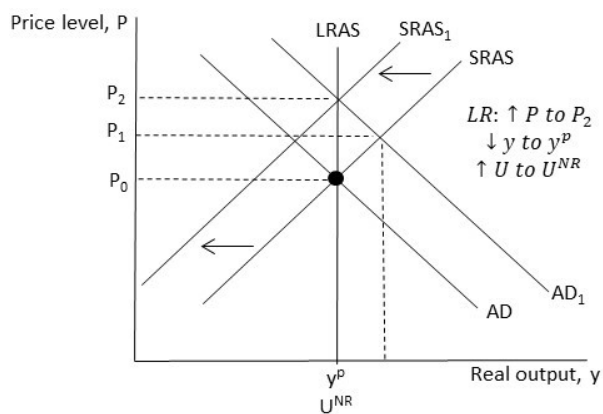
Most cases will work as follows. Something will shock the AD curve. Then the SRAS curve will shift to get everything back onto the LRAS curve. And, we will generally assume that the aggregate price level is slow to adjust.

For example, an increase in consumption will shift it to the right. Now the new AD and the SRAS cross off to the right of the LRAS curve so that the price level is higher and current output is above long-run potential output (and unemployment is lower than the natural rate).



Firms and households all see the higher price level (firms also see low unemployment and have a challenge hiring workers without offering them higher wages) and as they come to expect that indeed the price level is and will remain higher, they negotiate higher salaries and other input costs for firms. This is an increase in the expected price level, P^e , which shifts the SRAS curve leftward until AD and SRAS cross on the LRAS curve again.

As can be seen in the graph, in the end, we have returned to the LRAS curve and our potential output and natural rate of unemployment. Now the economy is at rest once again and will remain here until another shock occurs.



7 Time Paths

The final piece is to draw time paths for all the variables of interest. In the case of AS-AD analysis, we are usually interested in P , y , and U . Notice that y and U will move in opposite directions since higher output, y , means lower unemployment and vice versa. And, while the price level may jump a little at first, it is slow to adjust thereafter.

