Chapter 19

Prices and Output in an Open Economy: Aggregate Demand and Aggregate Supply

"As it is the nominal or money price of goods, therefore, which finally determines the prudence or imprudence of all purchases and sales, and thereby regulates almost the whole business of common life in which price is concerned, we cannot wonder that it should have been so much more attended to than the real price."

Adam Smith, <u>Wealth of Nations</u>, Book I, Chapter V.

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II. Chapter Summary and Review

Note: The material in this chapter incorporates most of the material in the past five or six chapters and so can get complex. It is impossible to provide an encyclopedic analysis of every possible change and adjustment, so only selected examples are provided. Work through the examples carefully in order to understand how the model can be applied to different examples provided in the Questions section.

Changes in the price level have previously been assumed to occur only when production exceeds its full employment level. We know, however, that price changes can occur over many levels of employment, and inflation can occur even when there is less than full employment. The **aggregate demand (AD)** and **aggregate supply (AS)** model is introduced in this chapter in order to explicitly consider the price level and inflation.

In most versions of the AD-AS model, the **short-run aggregate supply** (**SRAS**) **curve** is upward sloping. If prices increase, there are principally two reasons why firms may increase production. First, if prices increase then firms not realizing that wages and other input prices will increase, will attempt to increase profits by increasing production. Second, many input prices are relatively fixed in the short run by implicit and explicit contracts and workers may not realize that goods prices are increasing. (An example of an implicit contract is the convention that wages are reviewed once per year, remaining constant between years.) If prices increase, then each firm is aware that its prices are increasing and will attempt to hire more labor at slightly higher wages, which labor construes as a real increase in wages because they have yet to realize prices have increased. The short-run AS curve is upward sloping because firms, laborers and other suppliers are not aware that all prices are increasing.

Although the short-run AS curve is upward sloping, the **long-run aggregate supply (LRAS) curve** is vertical at the **natural level of output.** The natural level of output is that which is consistent with full employment of resources and stable inflation. Although a price increase may increase production in the short run, in the long run, labor and other input suppliers realize that goods prices have increased and contracts are renegotiated to reflect the higher average price of goods. Wages are increased and firms return to the natural level of output, with no change in real wages. A higher price level, in and of itself, cannot create more production in the long run. In the long run, the quantity and quality of the factors of production determine production.

In the short run, an unexpected upward shift of the **aggregate demand curve** will lead to an increase in prices and output, moving the economy along the upward sloping AS curve. (If the increase in AD was expected, then the resulting increase in prices would have been anticipated and incorporated in contracts, producing a vertical AS curve even in the short run.) In the long run, the economy returns to the vertical long-run AS curve.

If the AD curve and the short-run AS curve do not intersect at the vertical long-run AS, then market adjustments will change the short-run AS until there is full employment. If production is currently above full employment, then labor market pressures will tend to increase wages and other input prices which will shift the short-run AS curve to the left until full employment is reached. If production is currently below full employment, then wages and other input prices will tend to fall, shifting the AS curve to the right until full employment is reached. Because this adjustment may take some time, policy makers may be interested in using policy to speed the process. This chapter discusses which policies may be effective in shifting AD to produce full employment, and how economies adjust to disturbances.

The primary effect of incorporating international transactions in the AD-AS model is on AD. (AS can, however, be affected because imports make cheaper inputs possible.) The AD curve is derived from the IS-LM-BP analysis and the formal derivations are developed in the *International Economics* text. What follows is an intuitive explanation of the influence of international transactions on AD.

The effect of international transactions on AD will differ depending upon the exchange rate system. We consider first a fixed exchange rate system. The AD curve in a closed economy is downward sloping because a reduction in prices, for a given nominal money supply, means an increased *real* money supply. With more real money there will be lower interest rates and more spending. In an open economy there are also international effects. A lower national price level (relative to trading partners) will increase exports and reduce imports, providing additional demand. Thus, in an open economy the AD curve is flatter than in a closed economy, meaning that a decrease in the price level generates greater additional demand in an open economy than in a closed economy. There will also be some monetary effects in a fixed exchange rate system because the lower price level increases net exports and puts upward pressure on the exchange rate so the domestic currency must be sold, thereby increasing the money supply, which further increases aggregate demand. (The above discussion assumes a price level decrease. The *International Economics* text assumes an increase in the price level and then derives the AD curve in an open economy and a closed economy using IS-LM-BP analysis.)

With flexible exchange rates a price reduction will, as in the fixed case, increase the real money supply, increase exports, and decrease imports. In addition, there may be currency appreciation or depreciation, depending upon the effect on interest rates and the mobility of financial capital. Note that the increase in the real money supply *decreases* interest rates, but the increased exports and reduced imports increases the domestic demand for money, which may *increase* interest rates. If expanded exports and reduced imports are exactly offset by the effect of lower interest rates in producing a financial capital outflow, then there is no change in the balance of payments and the exchange rate will not change, leaving the effect identical to that with fixed exchange rates.

With either exchange rate system, the AD curve tends to be flatter because of the additional domestic spending produced by the effect of lower prices in expanding exports and reducing imports. The particular shape of the AD curve under fixed and flexible exchange rates is not of the utmost importance. In either case the AD curve remains downward sloping, as in the open economy case. More important is the AD-AS analysis of how economies adjust to changes under fixed and flexible exchange rates. Some examples follow, using both the AD-AS and IS-LM-BP analyses.

Consider, first, a change emanating from outside a nation, such as an increase in foreign incomes. The primary effect of a change in foreign incomes is that foreign economies will import more, so the nation's exports will increase. Consider first the adjustment with *fixed exchange rates* starting from equilibrium in all three sectors—point E in both the IS-LM-BP and AS-AD diagrams in Fig. 19.1. With additional exports, the IS curve will shift to the right due to the increased expenditures, as shown in Fig. 19.1. In addition, the BP line will shift down because the interest rate can be lower for external balance, because with the additional exports, the interest rate need not be as large to attract foreign financial inflows. The shift down of the BP line is shown in Fig. 19.1. With a shift down of the BP line and a shift up of the IS curve, the new IS curve and the original LM curve must intersect above the new BP line. Because IS and LM intersect above the BP line, there is a balance-of-payments surplus, which will create pressure for the exchange rate to appreciate. In a fixed exchange rate system, the monetary authorities must sell their currency on foreign exchange markets to maintain a fixed exchange rate. This will cause an increase in the amount of domestic money circulating, shifting the LM curve to the right until it intersects the new IS and BP lines at point E_1 . The expanded exports and the increase in the money supply necessary to maintain the fixed exchange rate will increase the amount of spending in the economy by the distance from Y_E to Y_1 . AD increases by the same distance, as shown by the arrow in the AS-AD diagram in Fig. 19.1. With an upward-sloping AS curve, some of this increased AD will translate into a price increase, producing a new equilibrium level at point E', at which output is Y_E' .



Summary: In a fixed exchange rate system, an increase in foreign income increases a nation's exports, which causes, indirectly, an increase in the domestic money supply through intervention in the foreign exchange market. Both the increased exports and money supply increases AD, causing an increase in the price level and output. In the long run, when the AS curve is vertical (not shown), the increase in demand will lead only to an increase in the price level. (Note that the increase in the price level produces further changes in the IS, LM and BP curves that are not shown.) Note that the above analysis applies to any change that shifts the IS curve to the right, such as an increase in investment in plant and equipment and an increase in government spending.

With flexible exchange rates, the effect is quite different. As with fixed rates, the IS curve will shift up and the BP curve will shift down. IS and LM intersect above the BP line, indicating a surplus. The surplus means excess demand for domestic currency so the exchange rate will appreciate. As the exchange rate appreciates, exports fall and imports increase, shifting the IS curve down and the BP curve up. This will continue until there is no longer a surplus, which will be when the IS and BP curves have returned to their original

positions. With flexible exchange rates, there is no change in AD. (Diagram the changes to confirm there will be no change in AD.)

The effects of any change can be determined by first considering how the IS-LM-BP schedules change, and then determining the automatic adjustments that will take place for either a fixed exchange rate system or a floating exchange rate system.

We now extend the analysis of monetary and fiscal policy to include the effects of policy within the AS-AD framework. In Chapter 18 it was shown that in a fixed exchange rate system, fiscal policy is effective in changing output, but monetary policy is ineffective. A quick review of this while incorporating it into the AD-AS framework may be useful. Assume throughout the analysis that financial capital is highly mobile internationally so the BP curve is flat (or at least flatter then the LM curve). Follow along with the explanation by drawing the graphs. If there is an increase in government spending (or a reduction in taxes), then the IS curve will shift to the right and intersect the LM curve above the flat BP line, indicating a surplus. This will put upward pressure on the exchange rate to which the monetary authorities will respond by selling domestic currency on the foreign exchange market, which will increase the money supply, shifting the LM curve to the right. The LM curve will shift to the right until it intersects the IS curve on the BP line. With IS and LM both shifted to the right, the level of output must increase, so AD increases. *Fiscal policy is effective in a fixed-rate system*.

Now consider monetary policy in a fixed exchange rate system. An increase in the money supply shifts LM to the right, intersecting the IS curve below the BP line, indicating a deficit. The downward pressure on the currency will lead the monetary authorities to buy domestic currency on the foreign exchange market, which reduces the money supply, shifting the LM curve back where it came from. This will continue until LM again shifts the IS curve on the BP line, producing no change in output. *Monetary policy cannot shift the AD curve in a fixed exchange rate system, so monetary policy is ineffective in a fixed rate system.*

With flexible rates, the effectiveness of policy is reversed. If fiscal policy is used to shift the IS curve to the right, then it will intersect the LM curve above the BP line, indicating a surplus. The domestic currency will appreciate, causing a reduction in exports and an increase in imports, shifting the IS curve to the left. The IS curve will shift back to the left until it intersects the LM curve at the BP line, which means the IS curve returns to where it started. *Fiscal policy cannot*

change AD in a flexible exchange rate system, so fiscal policy is not effective in a flexible-rate system.

Monetary policy is effective with flexible exchange rates. If the money supply is increased, then the LM curve shifts to the right, intersecting the IS curve below the BP line, indicating a deficit. The domestic currency will depreciate, causing an increase in exports and a decrease in imports, which shifts the IS curve to the right until it intersects the new LM curve on the BP line. With both LM and IS shifting to the right, there will be an increase in output. *Monetary policy can change AD in a flexible exchange rate system, so monetary policy is effective in a flexible exchange rate system.*

As mentioned above, departures from the natural rate of output will be self-correcting, so policy is not necessary, assuming the corrections are relatively quick. If, however, the period in which the correction takes place is lengthy, policymakers may attempt to speed up the return to the natural rate of output with fiscal and monetary policies. With fixed exchange rates, it is fiscal policy that will be effective. With floating exchange rates, it is monetary policy that will be effective.

III. Questions

- **1.** How will the following events affect an upward sloping BP curve?
- a) An increase in foreign income
- b) An appreciation of the domestic currency
- c) An increase in foreign interest rates
- d) A tax on purchases of foreign assets by domestics
- **2.** Answer Question 1 for a horizontal BP curve.
- **3.** How will the following events *directly* affect the IS curve?
- a) An increase in foreign income

- b) An appreciation of the domestic currency
- c) A decrease in the income tax rate
- d) An increase in the money supply

4. How will the following events *directly* affect the LM curve?

a) The monetary authorities buy domestic currency in the foreign exchange market

b) The monetary authorities undertake open market purchases of government securities

- c) An increase in foreign income
- d) An appreciation of the domestic currency

5. Suppose that AD and the short-run AS curve intersect below the natural rate of output?

a) What will happen if no policy actions are taken?

b) Why might policy makers choose to undertake policy?

6. How will the following events affect the AD curve in a fixed exchange rate system? Assume a flat BP line.

a) An increase in foreign income

- b) An increase in government spending
- c) An increase in the money supply
- d) Anti-trade sentiment that reduces the level of imports from foreign nations

e) An increase in foreign interest rates

7. Answer question 6 assuming a flexible exchange rate system.

8. a) Explain what happens to equilibrium output in the *short run* if there is a reduction in foreign incomes and exchange rates are fixed. Assume the BP line is flat.

b) What will happen in part a in the long run?

c) What policy could be used to hasten the process in part b?

9. Assume a supply shock in which the vertical long-run AS curve shifts to the left and the short-run AS curve shifts to the left by a larger amount. (Supply shocks are not reviewed in the above Summary and Review, but are developed in the *International Economics* text.)

a) Why might the short-run AS curve shift to the left more than the long-run AS curve? (This question is a bit of a stretch; it is not treated in the text or in the above Summary and Review.)

b) Relative to the initial equilibrium, what is the state of this economy as a result of the supply shock?

c) Explain what happens if no policy actions are taken.

d) What could policy makers do to speed the process in part b? Does it matter if exchange rates are flexible or fixed?