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International Finance (Econ 421)
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Handout #8: Output and the Exchange Rate

1. Introduction

So far we have taken output as given. We discussed how changes in output affect the exchange rate through its effect on money demand; however, we did not consider the factors that determine output. We now turn to discuss its determinants in the short run.

This handout puts the last building block in our model of exchange rate determination by endogenizing output and analyzing its short run behavior. Specifically we will explore the goods market and then see how developments there interact with changes in the asset markets. This interaction will simultaneously determine output and the exchange rate, and will complete our model of exchange rate determination. We will then have the tools to analyze the macroeconomic effects of monetary policy (changes in money supply) and fiscal policy (changes in government spending and taxes).

It should be stressed that our discussion here is aimed to analyzing short run effects. Recall that we have already discussed the long run of both real and monetary sides in previous handouts.

2. The Goods Market

In this section we take a Keynesian approach to the short run determination of output. Specifically, we will assume that output is determined by demand, while suppliers play a passive role as they simply adjust their production to supply whatever quantity consumers demand. We therefore start by discussing the factors that affect demand for domestic output.

After determining output in the goods market, we turn to build an *equilibrium relationship* between output and the exchange rate. We will see that changes in the

exchange rate affect the equilibrium in the goods market; hence, we can construct a curve that tells us what level of output is consistent with each value of the exchange rate.

2.1. The Keynesian Cross

Recall our discussion in Handout 1 about national income accounting. Equating resources and uses results in the following identity:

$$\boldsymbol{Y = C + I + G + CA} \qquad \textbf{(1)}$$

Where Y is GNP, C consumption, I investment, G government spending, and CA is the current account. The right hand side of (1) describes how the available resources, Y, are being used by different consumers. We will treat the right hand side as the demand function for domestic products.

We will focus our attention on the determinants of demand for consumption, C, and the current account, CA. For simplicity we will assume that government spending, G, and investment, I, are given exogenously and in particular they do not change with output and the exchange rate.

2.1.1. Consumption Demand

We assume that consumption depends only on disposable income[1], Y^d. Specifically, we assume that C is a linear and increasing function of Y^d.

$$\boldsymbol{C = C(Y^d) = C_0 + MP_C \cdot Y^d} \qquad \boldsymbol{C_0 > 0} \text{ and } \boldsymbol{0 < MP_C < 1} \qquad \textbf{(2)}$$

Where C_0 is an ***autonomous consumption***, which is the level of consumption demand when income is zero; and MP_C is the ***marginal propensity to consume***. It measures the increase in consumption demand due to an increase in one unit in disposable income. MP_C is positive since we assume that consumption is a normal good, i.e. increases with income.[2] Notice that we assume that $MP_C < 1$ to reflect the fact that we do not use all of our income for consumption, we also save some of it.[3]

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[1] Recall that disposable income is the *net* income available for consumption and saving; in other words, this is the after tax income of households.

[2] Consumption falls on both home and foreign goods. We will assume that both goods are normal.

[3] If we denote by MP_S the marginal propensity to save (i.e. the increase in savings due to an increase in one unit in disposable income), then by construction we get: $MP_C + MP_S = 1$.

In what follows we will write disposable income as:

$$Y^d = Y - T \tag{3}$$

2.1.2. The Current Account

Recall that from the national accounting identities, the current account is the sum of the trade balance (exports minus imports) and interest payment on foreign debt:

$$CA = EX - IM + rB^* \tag{4}$$

In our analysis we will put the emphasis on the trade balance and suppress the role of interest income. We assume that two factors affect the current account; the real exchange rate and disposable income. The current account increases with the real exchange rate and falls with disposable income:

$$CA = CA\left(\underset{+}{q}, \underset{-}{Y^d}\right) \tag{5}$$

When disposable income increases consumers want to consume more. The increase in consumption falls on both domestic and foreign products; as a result, a higher Y^d leads to a higher level of imports and therefore a lower current account. Notice that exports, on the other hand, do not depend on (domestic) disposable income since these are determined by demand of foreigners.

The real exchange rate, q, affects both exports and imports. As the domestic currency depreciates in real terms (q increases), domestic products become cheaper relative to foreign products and therefore both foreigners and domestic residents shift their consumption away from foreign products and towards domestic ones. That is, when q increases exports increase and imports fall, as a result the current account increases[4].

As in the case of consumption, we assume that the current account is a linear function of Y^d:

$$CA = CA_0\left(\underset{+}{q}\right) - MP_{IM}Y^d \tag{6}$$

[4] It should be noted that in fact the effect of the real exchange rate on imports (*IM*) is ambiguous because *IM* is measured in units of domestic products. As q increases the home country imports fewer units of foreign products which, in turn, reduces *IM*. However, each foreign unit worth now more domestic units (since q is higher) therefore even though the economy imports less units, it is still possible that the value of imports is higher due to the price effect. We assume that the quantity effect dominates and therefore imports fall with the real exchange rate.

Where CA_0 is an increasing function of the real exchange rate, and MP_{IM} is the marginal propensity to import. That is, it is the increment in imports that results from one unit increase in disposable income.

2.2. Equilibrium in the Goods Market

Given our assumptions about the different components of aggregate uses, we can now construct the ***aggregate demand function*** for domestic output:

$$\boldsymbol{D = C_0 + I + G + CA_0(q) + MP_D \cdot Y^d} \qquad \textbf{(7)}$$

Where MP_D is the difference between MP_C and MP_{IM}. Notice that since consumption includes both home and foreign goods, MP_C captures the increase in both goods when disposable income increases. Subtracting MP_{IM} from MP_C simply nets out the foreign component; as a result MP_D captures the increase in consumption of home goods due to an increase in Y^d. Since we assume that home goods are normal, it must be the case that MP_D is positive; and since $MP_C < 1$ it follows that $MP_D < 1$ as well. Putting together we get $0 < MP_D < 1$.

Notice that by collecting the first four terms in (7) and by using (3), we can write aggregate demand as:

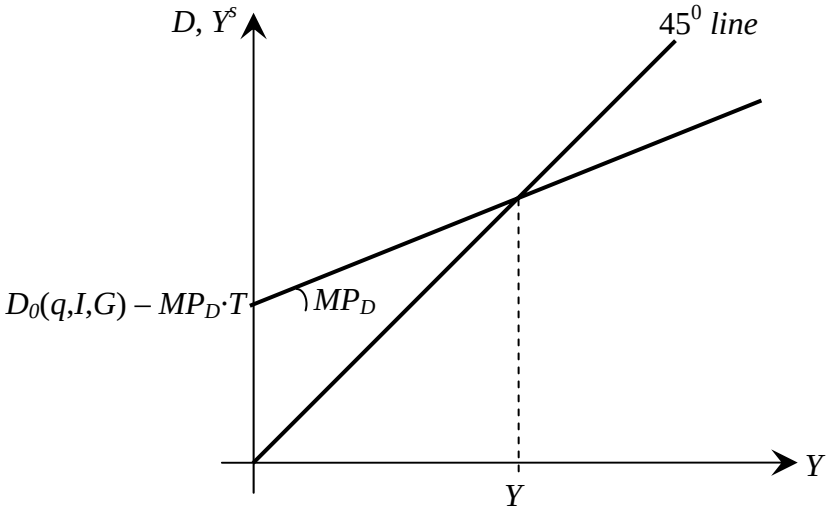
$$\boldsymbol{D = D_0(q,I,G) + MP_D \cdot Y^d = D_0(q,I,G) + MP_D \cdot (Y - T)} \qquad \textbf{(8)}$$

As mentioned earlier, the supply side of the model always adjusts to satisfy demand. Equilibrium in the model is therefore given by:

$$\boldsymbol{Y = D} \qquad \textbf{(9)}$$

Figure 1 provides a graphical exposition of this equilibrium condition. The figure plots aggregate demand against Y. The slope of aggregate demand is MP_D while the intercept is $D_0(q,I,G) - MP_D \cdot T$. We can redefine D_0 to include an additional term; however, it turns useful not to do that especially if we wish to analyze the effect of taxes.

Figure 1: The Keynesian Cross – Equilibrium in the Goods Market



The supply side is represented by the 45 degree line; putting differently, supply is captured by the trivial equation $Y^s = Y$.

The intersection of the two lines constitutes an equilibrium in the goods market. Notice that any quantity to the left of the intersection results in excess demand, since consumers want to consume more than the available output; while any quantity to the right of the intersection results in excess supply, as consumers want to consume less than Y at these levels of output.

Figure 1 is known as the ***Keynesian cross***. It should be noted that this diagram provides one of the basic elements in Keynesian theory. Specifically, the Keynesian cross motivates active government policies that stimulate the economy through an increase in government spending or tax cuts. The basic idea is that when government spending increases by \$1 output in the economy increases by ***more*** than \$1 through a multiplier effect.[5] This theory, however, lost its popularity during the 1970s on the grounds that it provides only a static analysis, and some of its central predictions change once we introduce dynamics with rational expectations into the model.

[5] This can be easily seen from Figure 1. When G increases by one unit, aggregate demand shifts upward by one unit. However, the intersection with the 45 degree line moves to the right by more than one unit. Notice that equilibrium output reacts more dramatically as the slope of aggregate demand approaches 1.

2.2.1. The Keynesian Multiplier

To see the multiplier effect solve for equilibrium output using (8) and (9). The result is:

$$\boldsymbol{Y = \frac{D_0 - MP_D \cdot T}{1 - MP_D}} \qquad \textbf{(10)}$$

This equation suggests that when D_0 increases by one unit, equilibrium output increases by $1/(1 - MP_D)$ units, i.e. by more than one unit. The expression $1/(1 - MP_D)$ is known as the ***Keynesian multiplier***. Recall that $D_0 = C_0 + I + G + CA_0(q)$; therefore, when government spending (or any other element of D_0) increases output increases by more than the increase in G.

In order to understand this result intuitively, note that when G increases by one unit, domestic income increases by one unit as well (assume that G is spent entirely on domestic products). According to the aggregate demand function, equation (8), this increase in income generates an increase in consumption of home goods at size MP_D, which in turn increases incomes in the economy by an additional MP_D. This new increase in income generates additional increase in consumption of size MP_D^2, which in turn increases income in the economy by the same amount. This process continues until the economy converges to a new equilibrium.

We can now calculate the total increase in income, it is given by:[6]

$$1 + MP_D + MP_D^2 + MP_D^3 + \ldots = \frac{1}{1 - MP_D}$$

Which is exactly the Keynesian multiplier.

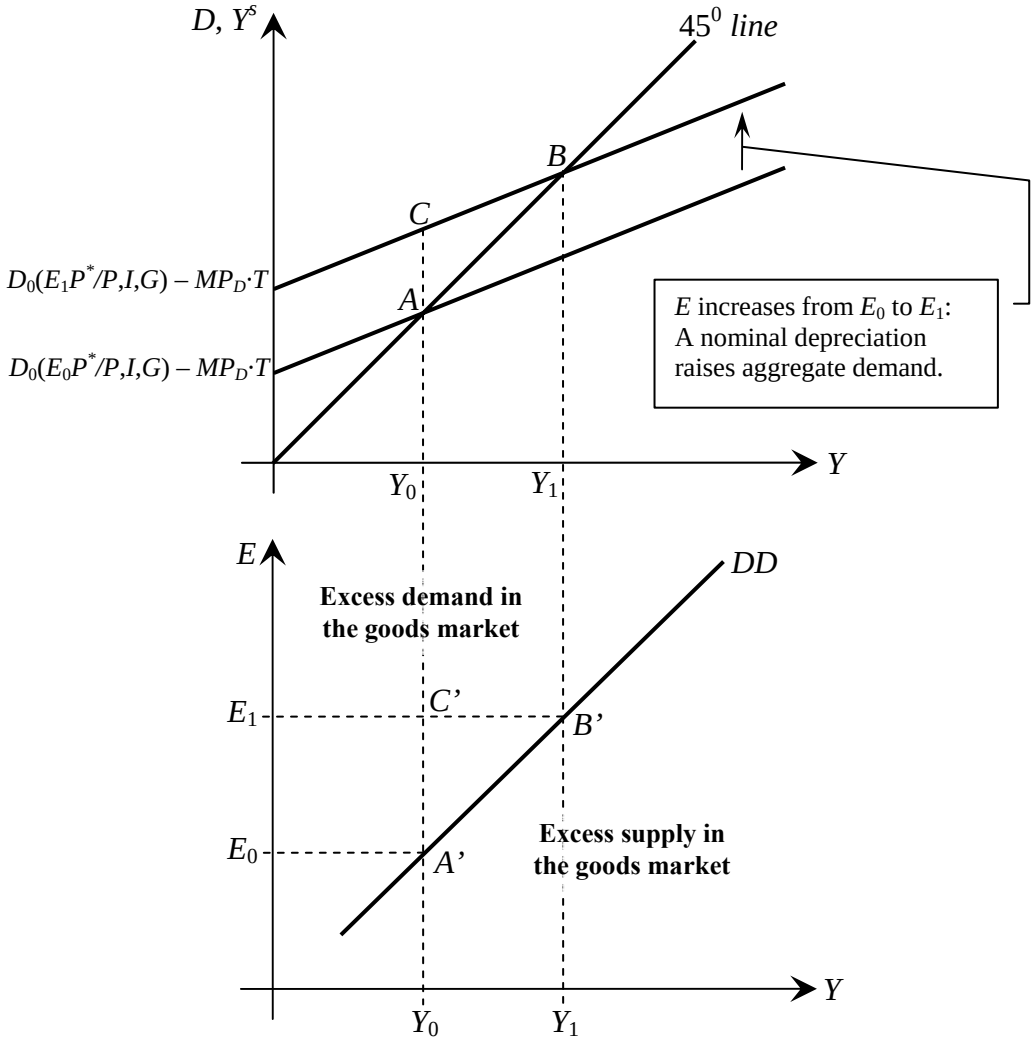
2.3. An Equilibrium Relationship: The DD Curve

We now turn to construct a relationship between the nominal exchange rate, E, and output, Y, as implied by equilibrium in the goods market.

So far we have not introduced explicitly the nominal exchange rate into our model. However, recall that $q = EP^*/P$ and that in the short run prices are sticky. As a result, fluctuations in E translate immediately into fluctuations in q, and hence into movements in the current account and aggregate demand.

[6] The result follows from the formula for a sum of an infinite converging geometric series.

Figure 2: Constructing the *DD* Curve



Specifically, an increase in E (nominal depreciation), increases q (real depreciation). This, in turn, improves the current account (CA increases) and therefore increases aggregate demand. As aggregate demand increases, equilibrium output increases as well.

Figure 2 demonstrates this movement. In the figure the exchange rate increases from E_0 to E_1, as a result aggregate demand shifts upward (through the effect of q on D_0) and equilibrium in the goods market moves from point A to point B, resulting in a higher output. We have therefore established that in the goods market an increase in E implies a higher Y.

By repeating this exercise for many different values of E we can construct a curve that pairs E and Y such that the goods market is in equilibrium. We denote that curve by *DD*. The lower panel of Figure 2 demonstrates how we construct two points of *DD* for two different levels of E. As the exchange rate increases from E_0 to E_1 equilibrium in the goods market shifts from point *A* to point *B*. We then read the corresponding levels of the output, Y_0 and Y_1, on the horizontal axis of the lower panel of Figure 2, and the levels of the exchange rate, E_0 and E_1, on the vertical axis. Notice that since an increase in E increases Y, the *DD* curve is upward sloping.

Note that while changes in E ***shift*** the aggregate demand function, these changes are reflected by a movement ***along*** the *DD* curve. Changes in other variables, such as government spending, taxes, and the price level, for example, result in a shift of both aggregate demand and the *DD* schedule. As a rule of thumb, whenever aggregate demand shifts upward the *DD* curve shifts to the right, and whenever aggregate demand shifts downward the *DD* curve shifts to the left. The only exception is, of course, movement in aggregate demand that results from a change in the exchange rate.

Finally, notice that we can associate the area above the *DD* curve with excess demand in the goods market, and the area below it with excess supply. To see that, consider point *C'* in the lower panel of Figure 2. Given the output level Y_0, the exchange rate that clears the goods market is E_0. However, at point *C'* the exchange rate is E_1, which is higher than E_0. As a result, the *CA* that is associated with E_1 is greater than the *CA* that is associated with E_0 (given the same level of output, Y_0); since as the domestic currency depreciates both foreign and domestic demands shift from foreign goods to domestic goods. Given that point *A'* represents an equilibrium in the goods market; we can now conclude that point *C'*, or any other point above the *DD* schedule, is associated with excess demand in the goods market.

2.3.1. The DD Curve and the Current Account

Given our assumptions regarding the goods market we can derive a relationship between movements along the DD schedule and the current account. Specifically, we show that as equilibrium output increases the current account improves.

When the exchange rate depreciates the current account improves, as CA_0 in equation (6) increases, and output expands. However, as output increases imports increase as well, which deteriorates the current account. The problem is to determine which effect is stronger.

Recall that aggregate demand is given by the sum of government spending, investment, private consumption, and the current account. In equilibrium aggregate demand equals output. Using equation (7) and equilibrium in the goods market we get:

$$(1 - MP_D)Y = C_0 + I + G - MP_D \cdot T + CA_0(q)$$

Since this equation imposes equilibrium in the goods market, it holds along the DD schedule.

Now consider an increase in the exchange rate (i.e. depreciation). The relationship above suggests that:

$$(1 - MP_D)\Delta Y = \Delta CA_0$$

And using (6):

$$\Delta CA = \Delta CA_0 - MP_{IM}\,\Delta Y$$

Therefore:

$$(1 - MP_D)\Delta Y = \Delta CA + MP_{IM}\,\Delta Y$$

But recall that $MP_D = MP_C - MP_{IM}$, therefore:

$$(1 - MP_C)\Delta Y = \Delta CA$$

Since $1 - MP_C > 0$ it follows that the model predicts that in equilibrium the current account moves in the same direction as output. Therefore, as the exchange rate depreciates and we move along the DD curve the current account improves.

Intuitively, as the exchange rate and output increase, two elements in aggregate demand move: consumption and the current account. The increase in consumption does not much the increase in output because a fraction $1 - MP_C$ is saved, therefore in order to bring the goods market to equilibrium demand of the external sector must increase as well, which suggests an improvement in the current account.[7]

[7] It should be noted that this result remains even if we extend the model to allow government spending and investment to react to the exchange rate and output. This extension would only complicate the derivation.

3. Equilibrium in the Asset Markets: The AA Curve

Using a similar approach to the one used for deriving the *DD* schedule, we now turn to construct a curve that represents combinations of output, *Y*, and exchange rate, *E*, that constitute an equilibrium in the asset markets. We will denote this curve by *AA*.

In previous handouts we have discussed the money and the foreign exchange markets. These are represented by the money market equilibrium and the interest parity condition:

$$\boldsymbol{M^s/P = L(R,Y)} \qquad \textbf{(11)}$$

$$\boldsymbol{R = R^* + (E^e - E)/E} \qquad \textbf{(12)}$$

The upper panel of Figure 3 presents these equations graphically. We now turn to analyze how changes in output affect the exchange rate in the short run.

Given *M*, *P*, and *Y*, the interest rate, *R*, is determined in the money market using equation (11); and then, given *R*, R^*, and E^e, the exchange rate is determined by (12).

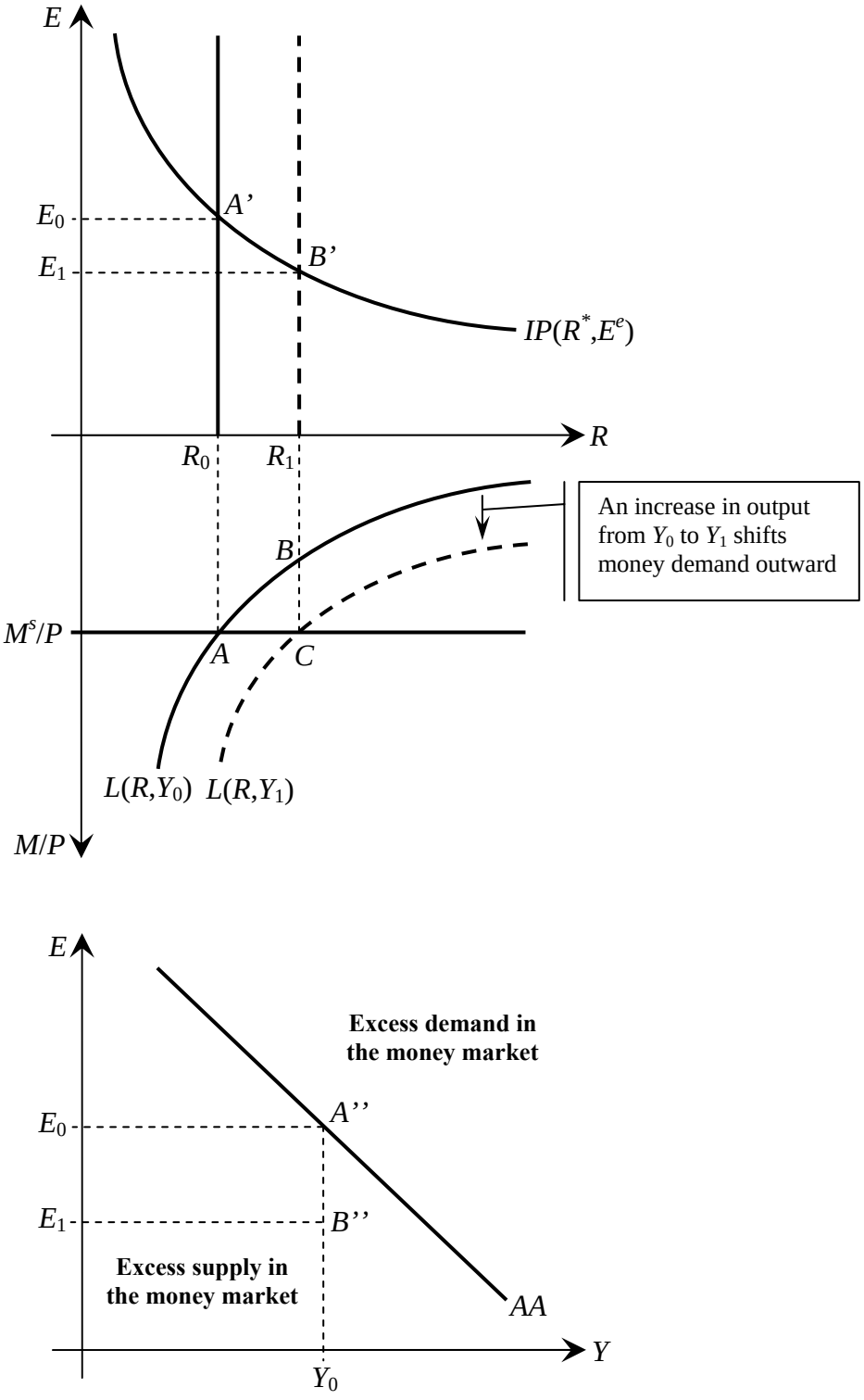
Consider an increase in output from Y_0 to Y_1. When output increases money demand shifts outward as depicted in Figure 3. At the ongoing interest rate, R_0, there is excess demand for real money balances. Since *M*/*P* is fixed in the short run, the interest rate must increase in order to bring the money market back to equilibrium. The new equilibrium is at point *C*. In the foreign exchange market, however, a higher interest rate requires an appreciation in the domestic currency in order to obey the interest parity condition. As a result *E* falls from E_0 to E_1. We can therefore conclude that in order to maintain equilibrium in the asset markets, an increase in *Y* must be accompanied with a fall in *E*. We define the *AA* schedule as the combinations of *Y* and *E* that constitute an equilibrium in the asset markets. Our conclusion above suggests that the *AA* schedule is downward sloping as depicted in the lower panel of Figure 3.

Note that while changes in *Y* ***shift*** the money demand function, these changes are reflected by a movement ***along*** the *AA* curve. Changes in other variables, such as money supply, foreign interest rate, and expectations, for example, shift curves in the asset markets (either money demand, *L*(*R*,*Y*), or the *IP* schedule) and the *AA* schedule.

As a rule of thumb, the *IP* schedule and the *AA* curve move in the same direction; that is, whenever the *IP* schedule shifts up the *AA* curve shifts upward as well, and vice versa. On the other hand, whenever money demand shifts outward the *AA* curve shifts down,

and whenever money demand shifts inward the *AA* curve shifts up. The only exception is, of course, movement in money demand that results from a change in output.

Figure 3: The *AA* Curve



Finally, notice that we can associate the area above the *AA* curve with excess demand in the money market, and the area below it with excess supply. To see that, consider point *B''* in the lower panel of Figure 3. Given the output level Y_0, the exchange rate that clears the asset markets is E_0. However, at point *B''* the exchange rate is E_1, which is lower than E_0. By the interest parity condition, the interest rate, *R*, that is consistent with E_1 is R_1. Given Y_0 and R_1, money demand is at point *B*, which results in excess supply in the money market. We can therefore conclude that point *B''*, or any other point below the *AA* schedule, is associated with excess supply in the money market.

4. The Goods and Asset Markets: A Simultaneous Equilibrium

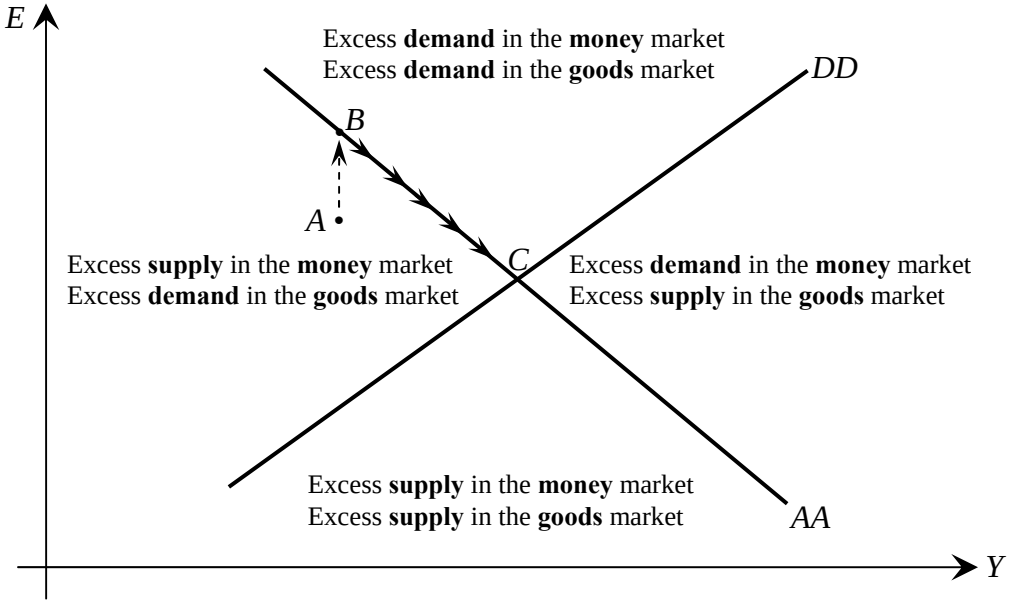
Points along the *DD* schedule are consistent with equilibrium in the goods market, while points along the *AA* schedule are consistent with equilibrium in the asset markets. General equilibrium, however, requires that all markets must clear simultaneously. Therefore, only a point that lies on both schedules simultaneously is consistent with general equilibrium. This point is given by the intersection of the two curves.

Figure 4 below divides the *E–Y* plane to four quadrants, each represents a combination of excess demand/supply in the goods/money markets. The only point in which there is no excess demand or supply in both markets is the point where the *DD* and *AA* schedules intersect, point *C*.

We can use this diagram to see how the economy converges to it's short run equilibrium if it happens to be positioned at a point where markets do not clear. In our analysis we will assume that the asset markets clear immediately, while the goods market adjusts at a slower pace, as it takes some time to adjust production level even in the short run.

Take point *A*, for example. At point *A* there is excess supply in the money market, and therefore the interest rate is higher than its short run equilibrium level. As agents try to get rid of the excess liquidity, the interest rate is pushed down and therefore the exchange rate depreciates. This is illustrated by a movement from point *A* to *B*.

Figure 4: General Equilibrium



At point *B* there is excess demand in the goods market, and therefore firms increase production in order to satisfy demand. Notice that as output increases money demand increases as well, which, in turn, puts pressure for a higher interest rate and hence a lower exchange rate. This increase in *Y* and fall in *E* is captured by a movement from point *B* to *C* along the *AA* curve. Finally, notice that as the exchange rate appreciates, the current account falls, and therefore the excess demand in the goods market is closed by both an increase in production and a fall in demand.

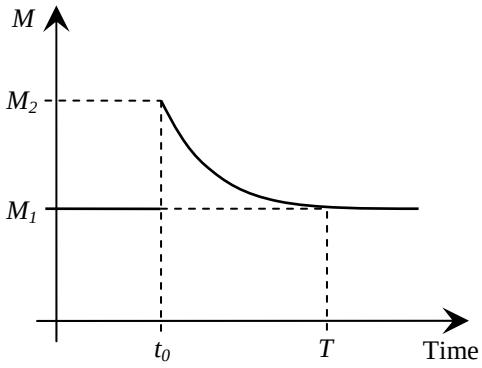
5. Changes in Monetary and Fiscal Policy

We now turn to analyzing the effect of different monetary and fiscal policies. You may find some of the exercises familiar from previous discussions; however, now we are able to incorporate the goods market into our analysis. We can now endogenize the behavior of output, and at the same time feed output movements back into the money market such that all markets are simultaneously in equilibrium.

5.1. Temporary Increase in Money Supply

As usual, assume that the home and foreign economies start from their long run equilibrium and that $R = R^*$. Now consider an unexpected temporary increase in the money supply. M increases at time t_0 and then gradually falls back to its original level, by time T money supply returns to its original level as depicted in Figure 5.

Figure 5: Temporary Monetary Expansion



The Long Run: In principle we should start the analysis from the long run in order to establish whether the shock has any effect on exchange rate expectations. However, since the shock is temporary the economy goes back to its original equilibrium and all variables return to their initial level including the exchange rate.

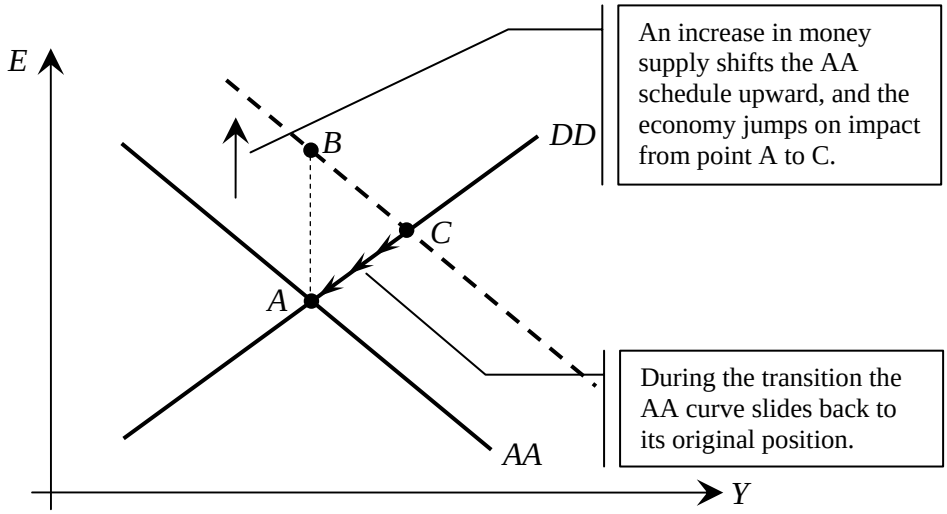
On Impact: In the money market the increase in money supply reduces the interest rate. As a result, using the interest parity condition, the exchange rate depreciates on impact. The depreciation, in turn, improves the current account and demand for domestic goods increases; as a result output increases as well.

This analysis, although valid, uses our standard approach of focusing on one market at a time. Notice that this approach is somewhat incomplete since the increase in output feeds back into the money market and starts a new round of secondary adjustments. In contrast, the AA-DD diagram automatically incorporates all feedback effects.

To see that notice that the initial shock, an increase in money supply, shifts the AA curve upward as depicted in Figure 6 below. Holding output fixed, this moves the economy from point A to point B. As the adjustments in the asset markets feed into the

goods market (and vice versa) the economy moves along the new AA curve to point C. At that point all feedbacks between the assets and goods markets are accounted for.

Figure 6: A Temporary Increase in M^s – The AA-DD Diagram



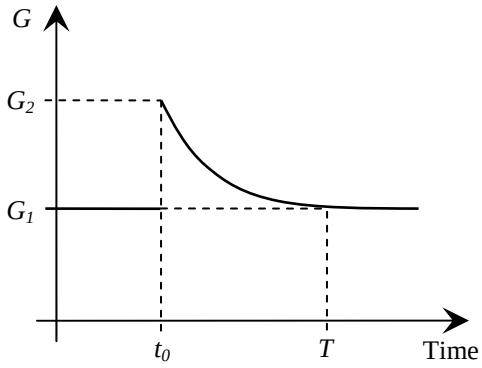
The transition: Since we have already concluded that there are no changes in the long run, the economy must go back to its original position at point A. How this transition comes about?

We know that there is no exogenous change in the goods market, therefore the DD schedule does not move. Also, since the exchange rate cannot jump along a perfect foresight equilibrium path it must be the case that the exchange rate converges to its long run level along the DD schedule by a gradual retreat of the AA curve. This movement comes about through the fall in money supply.

5.2. Temporary Increase in Government Spending

Assuming the economy starts from its long run equilibrium and that $R = R^*$, consider an unexpected temporary increase in government spending. G increases at time t_0 and then gradually falls back to its original level, by time T government spending returns to its original level as depicted in Figure 7.

Figure 7: Temporary Increase in G



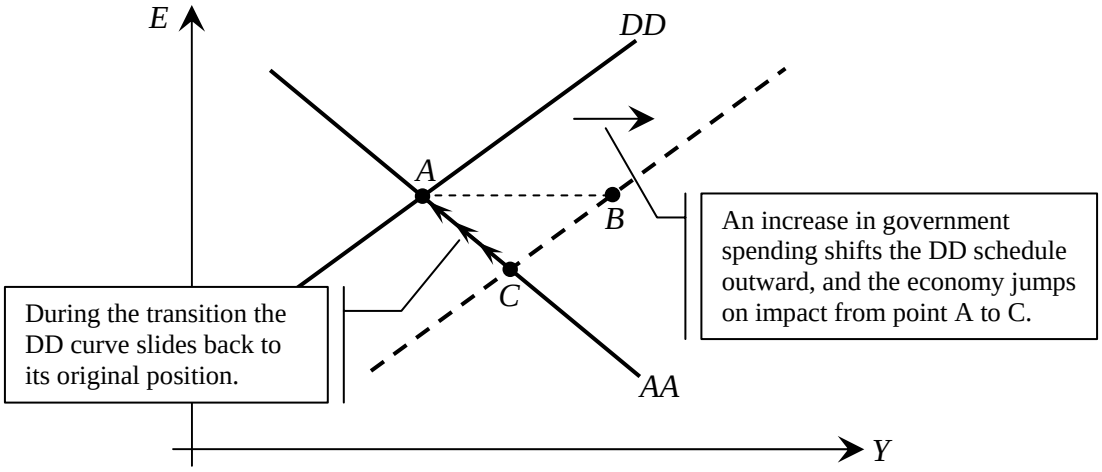
The Long Run: As in the previous case, the shock is temporary and therefore the economy goes back to its original equilibrium.

On Impact: The increase in *G* increases aggregate demand in the goods market and therefore output increases as well. In the money market, the increase in output increases money demand, which in turn increases the interest rate. Using the interest rate parity condition, a higher interest rate appreciates the domestic currency and hence *E* falls on impact.

As in the case of a temporary monetary expansion, this is only the first round of reactions. The appreciation of the currency feeds back into the goods market through its effect on the current account which partially offsets the initial response of output. This, in turn, reduces money demand, which reduces the interest rate, which depreciates the currency, and so on. As before, the AA-DD diagram takes these interactions between the markets into account.

An increase in government spending shifts the DD curve to the right as depicted in Figure 8 below. Holding the exchange rate fixed, this moves the economy from point A to point B. As the adjustments in the goods market feed into the asset markets (and vice versa) the economy moves along the new DD curve to point C. At that point all feedbacks between the assets and goods markets are accounted for.

Figure 8: A Temporary Increase in *G* – The AA-DD Diagram



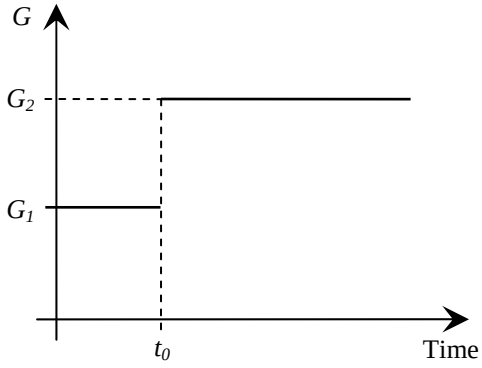
The transition: Since we have already concluded that there are no changes in the long run, the economy must go back to its original position at point A.

We know that there is no exogenous change in the asset markets, therefore the AA schedule does not move. Also, since the exchange rate cannot jump along a perfect foresight equilibrium path it must be the case that the exchange rate converges to its long run level along the AA schedule by a gradual retreat of the DD curve. This movement comes about through the fall in government spending.

5.3. Permanent Increase in Government Spending

Assuming the economy starts from its long run equilibrium and that $R = R^*$, consider an unexpected permanent increase in government spending. G increases at time t_0 and stays at its higher level forever as depicted in Figure 9. Assume that G falls entirely on domestic products.

Figure 9: A Permanent Increase in G



Before starting our analysis recall the result from the homework of Handout 7. There, we had exactly the same exercise with the exception that output was assumed to be fixed throughout the analysis. We concluded that the economy adjusts immediately through both nominal and real appreciations, other than that there was no other change. We will now see that this result holds even when output is endogenous.

The Long Run: The increase in government spending increases relative demand permanently, as a result there is a real appreciation in the long run, i.e. q falls. This adjustment can come about through a change in prices and/or a change in the nominal exchange rate.

The price level is pinned down using the money market equilibrium condition:

$$M^S/P = L(R,Y)$$

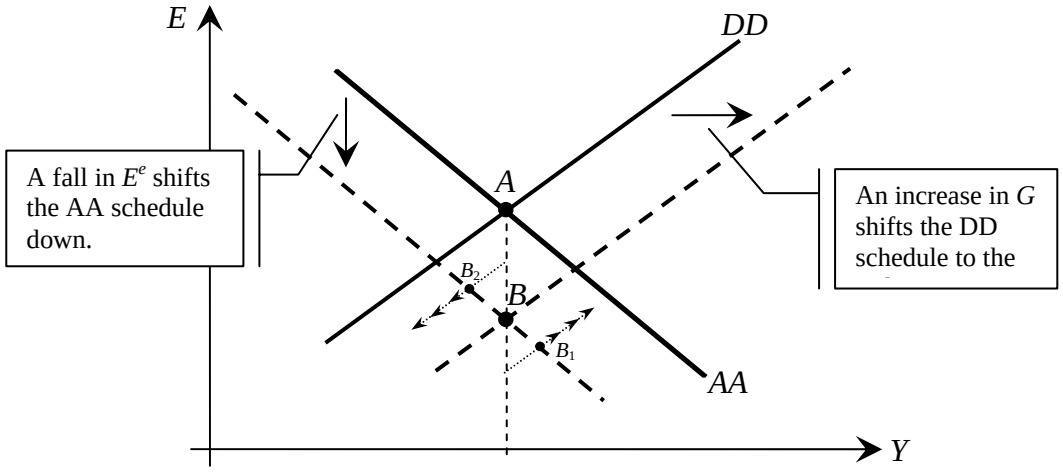
In the long run output is exogenous as it is determined by technology and the supply of production factors. Since we assume no changes in these variables, output does not change in the new long run equilibrium. In the long run the nominal interest rate, R, equals the real interest rate plus the growth rate of money, which are both exogenous. Therefore R does not change. Finally, money supply is also fixed and therefore we can conclude that the price level, P, does not change as well.

Same argument holds for P^*. Therefore, in the long run a real appreciation must be accompanied by a nominal appreciation of equal rate.

On Impact: In the foreign exchange market expectations regarding the future exchange rate fall since we have just concluded that the domestic currency appreciates in the long run. Using the interest parity condition we can conclude that the fall in expectations immediately translates into a fall in E.

In the goods market, there are two effects that work in opposite directions. First, the increase in G increases aggregate demand and therefore there are pressures on output to increase. Second, the nominal appreciation deteriorates the current account, which in turn reduces aggregate demand and puts pressure for a lower output. The problem is therefore to determine which force dominates. To that end we use the AA-DD diagram.

Figure 9: A Permanent Increase in *G* – The AA-DD Diagram



The increase in government spending shifts the DD curve to the right. The fall in expectations regarding the future exchange rate shifts the AA curve down. These movements are represented Figure 9.

The figure suggests that the curves move in a way that exactly offset each other and hence output stays constant. To see why this must be the case, suppose that the movement in DD dominates, and the economy moves to a point like B_1. In this case the increase in output feeds back into the money market, money demand increases, which in turn increases the interest rate. This is consistent with an exchange rate below its new long run equilibrium level, E^e, as suggested by B_1. However, this implies that the exchange rate must depreciate in the transition (which is consistent with the fact that in the transition from B_1 to the new long run equilibrium the interest rate must fall); such a depreciation will improve the current account and increase output even further. This movement is inconsistent with the long run level of output.

If, on the other hand, the economy starts from a point like B_2, then the opposite happens. The exchange rate must appreciate in the transition and output falls. Again, this result is inconsistent with a fixed long run level of output.

The only outcome that facilitates equilibrium in all markets simultaneously is that the two effects exactly counteract each other and the economy jumps from point *A* to *B* such that output stays constant and the economy finds itself immediately in its new long run equilibrium.

The fact that there is no transition and that a permanent increase in *G* cannot stimulate the economy even temporarily is a strong result, probably too strong. This is an abstract model, but still this exercise delivers an important message. The endogenous response of the exchange rate offsets fluctuations in aggregate demand and as a result helps stabilizing the economy. This has two implications: first, the Keynesian multiplier does not work in open economies as well as it does in closed economies because the exchange rate counteracts its effect; and second, exchange rate flexibility can serve as a shock absorber for the economy. Many countries tend to intervene in the foreign exchange markets in order to affect their exchange rate and hence manipulate the current account in their favor; however, by doing so they give up a channel that may help promoting economic stability.