

Output and the Exchange Rate in the short run

International Finance

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Introduction

- Macroeconomic changes that affect exchange rates, interest rates, and price levels may also affect output. This chapter introduces a new theory of how the output market adjusts to demand changes when product prices are themselves slow to adjust.
- A short-run model of the output market in an open economy will be utilized to analyze:
 - The effects of macroeconomic policy tools on output and the current account.
 - The use of macroeconomic policy tools to maintain full employment.

- Explain the role of the real exchange rate in determining the aggregate demand for a country's output.
- See how an open economy's short-run equilibrium can be analyzed as the intersection of an asset market equilibrium schedule (AA) and an output market equilibrium schedule (DD).
- Understand how monetary and fiscal policies affect the exchange rate and national output in the short run.
- Describe and interpret the long-run effects of permanent macroeconomic policy changes.
- Explain the relationship among macroeconomic policies, the current account balance, and the exchange rate.

Determinants of Aggregate Demand in an Open Economy

Aggregate demand

The amount of a country's goods and services demanded by households and firms throughout the world.

The aggregate demand for an open economy's output consists of four components:

- Consumption demand (C)
- Investment demand (I)
- Government demand (G)
- Current account (CA)

Consumption Demand

- Consumption demand increases as disposable income (i.e., national income less taxes) increases at the aggregate level.
- The increase in consumption demand is less than the increase in the disposable income because part of the income increase is saved.

Marginal propensity to consume

The part of an increase of disposable income that is use to consume

Current Account

- The Current Account balance is viewed as the demand for a country's exports (EX) less that country's own demand for imports (IM).
- The CA balance is determined by two main factors:
 - The domestic currency's real exchange rate against foreign currency ($q = EP^*/P$)
 - Domestic disposable income (Y_d)

How Real Exchange Rate Changes Affect the Current Account?

- An increase in q raises EX and improves the domestic country's CA . Each unit of domestic output now purchases fewer units of foreign output, therefore, foreign will demand more exports.
- An increase q can raise or lower IM (the value of imports measured in terms of domestic output), and has an ambiguous effect on CA .

Determinants of Aggregate Demand in an Open Economy

- There are two effects of a real exchange rate:

Volume effect

The effect of consumer spending shifts on export and import quantities

Value effect

It changes the domestic output worth of a given volume of foreign imports.

- Whether the CA improves or worsens depends on which effect of a real exchange rate change is dominant.
- **IMPORTANT!!!** We assume that the volume effect of a real exchange rate change always outweighs the value effect. A real appreciation decreases the current account

How Disposable Income Changes Affect the Current Account?

- An increase in disposable income (Y_d) worsens the **CA**.
- A rise in Y_d causes domestic consumers to increase their spending on all goods.

Determinants of Aggregate Demand in an Open Economy

Table 1: Factors Determining the Current Account

Change	Effect on current account, CA
Real exchange rate, $EP^*/P \uparrow$	$CA \uparrow$
Real exchange rate, $EP^*/P \downarrow$	$CA \downarrow$
Disposable income, $Y^d \uparrow$	$CA \downarrow$
Disposable income, $Y^d \downarrow$	$CA \uparrow$

The Equation of Aggregate Demand

The Equation of Aggregate Demand

The four components of aggregate demand are combined to get the total aggregate demand:

$$\mathcal{D} = C(Y - T) + I + G + CA(EP^*/P, Y - T) \quad (1)$$

This equation shows that aggregate demand for home output can be written as:

$$\mathcal{D} = D(EP^*/P, Y - T, I, G) \quad (2)$$

The Equation of Aggregate Demand: an increase in q raises CA and $\mathcal{D}$

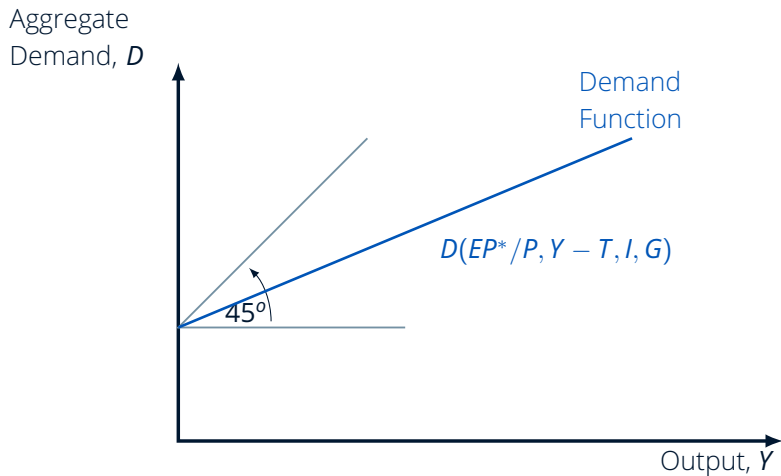
- It makes domestic goods and services cheaper relative to foreign goods and services.
- It shifts both domestic and foreign spending from foreign goods to domestic goods.
- A real depreciation of the home currency raises aggregate demand for home output.
- A real appreciation lowers aggregate demand for home output.

The Equation of Aggregate Demand: a raise in real income increases $\mathcal{D}$

- A rise in domestic real income raises aggregate demand for home output. But also for foreign output.
- A fall in domestic real income lowers aggregate demand for home output.

The Equation of Aggregate Demand

Figure 1: Aggregate Demand as a Function of Output Aggregate



How Output Is Determined in the Short Run

How Output Is Determined in the Short Run

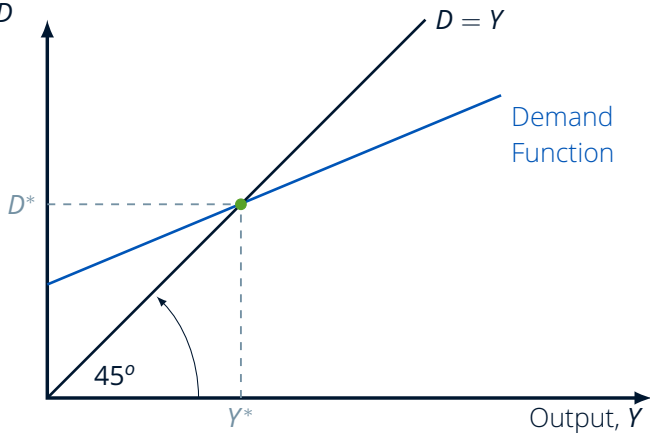
Output market is in equilibrium in the short-run when real output, Y , equals the aggregate demand for domestic output:

$$Y = D(EP^*/P, Y - T, I, G) \quad (3)$$

How Output Is Determined in the Short Run

Figure 2: The Determination of Output in the Short Run, the Keynesian cross

Aggregate
Demand, D



Output Market Equilibrium in the Short Run: The DD Schedule

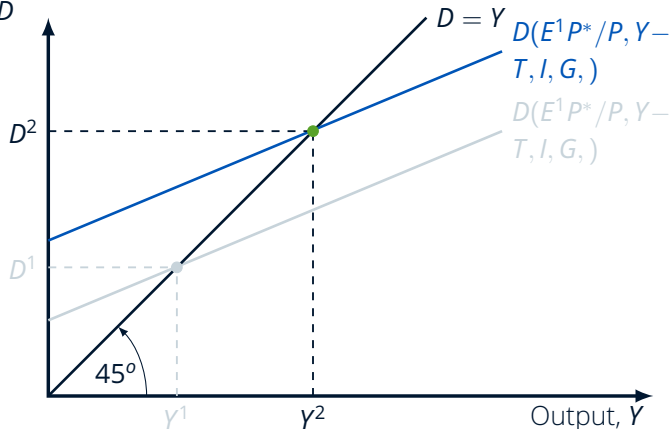
With fixed price levels at home and abroad, a rise in the nominal exchange rate makes foreign goods and services more expensive relative to domestic goods and services.

- Any rise in q will cause an upward shift in the aggregate demand function and an expansion of output.
- Any fall in q will cause output to contract.

Output Market Equilibrium in the Short Run: The DD Schedule

Figure 3: Output Effect of a Currency Depreciation with Fixed Output Prices

Aggregate
Demand, D



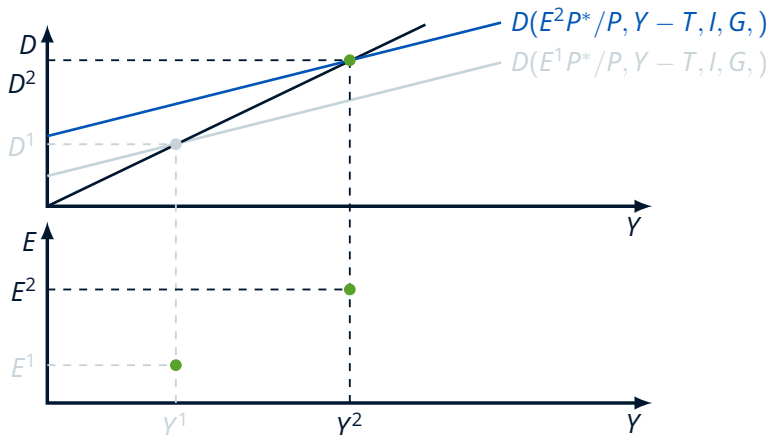
We will start from the output market to derive a relationship between exchange rate and output.

DD schedule

- It shows all combinations of output and the exchange rate for which the output market is in short-run equilibrium (aggregate demand = aggregate output).
- It slopes upward because a rise in the exchange rate causes output to rise.

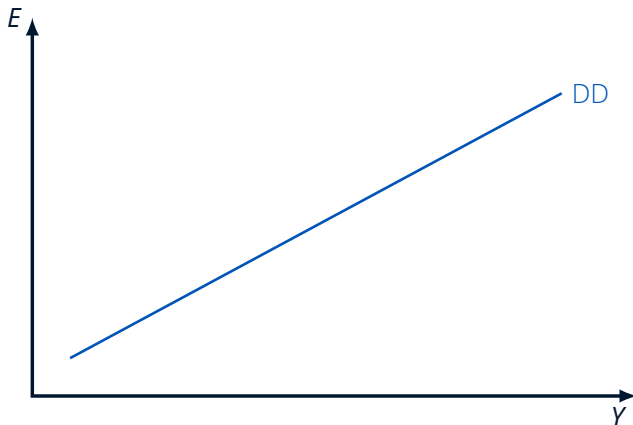
Output Market Equilibrium in the Short Run: The DD Schedule

Figure 4: Deriving the DD Schedule



Output Market Equilibrium in the Short Run: The DD Schedule

Figure 5: The DD Schedule



Output Market Equilibrium in the Short Run: The DD Schedule

Factors that Shift the DD Schedule

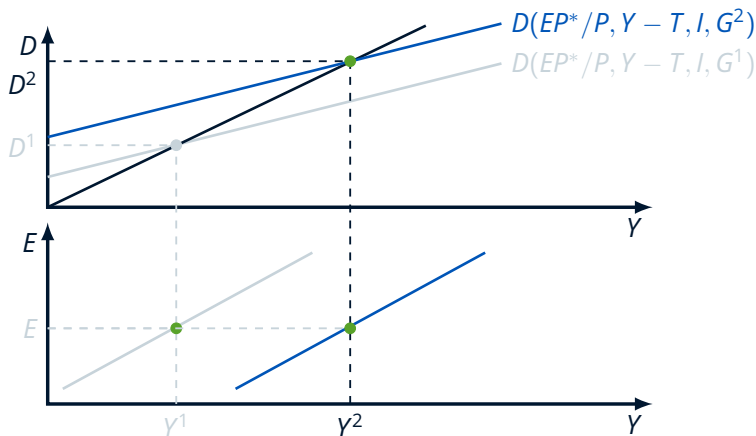
- Government purchases
- Taxes
- Investment
- Domestic price levels
- Foreign price levels
- Domestic consumption
- Demand shift between foreign and domestic goods

example

A disturbance that raises (lowers) aggregate demand for domestic output shifts the DD schedule to the right (left).

Output Market Equilibrium in the Sort Run: The DD Schedule

Figure 6: Government Demand and the Position of the DD Schedule



Asset Market Equilibrium in the Short Run: The AA Schedule

AA Schedule

It shows all combinations of exchange rate and output that are consistent with equilibrium in the domestic money market and the foreign exchange market.

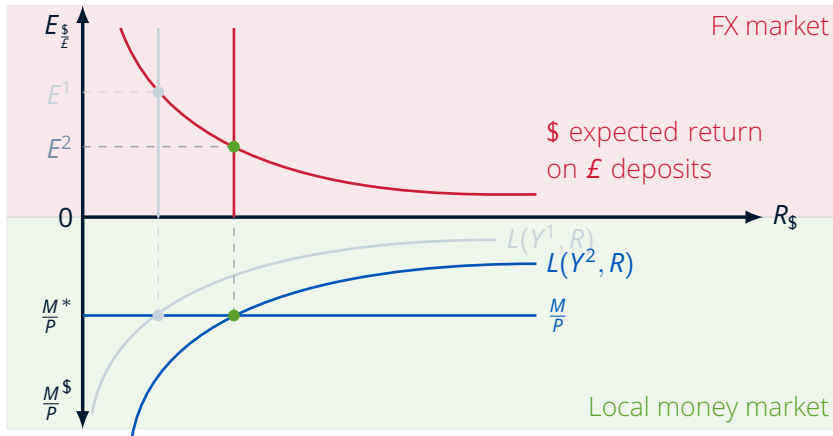
It slopes downward because a rise in output causes a rise in the home interest rate and a domestic currency appreciation.

Asset Market Equilibrium in the Short Run: The AA Schedule

- We will combine the interest parity condition with the money market to derive the asset market equilibrium in the short-run.
- UIP: $R = R^* + (E^e - E)/E$. where: E^e is the expected future exchange rate, and R is the interest rate on domestic currency deposits.
- The R satisfying the interest parity condition must also equate the real domestic money supply to aggregate real money demand: $M^s/P = L(R, Y)$
- Aggregate real money demand $L(R, Y)$ rises when the interest rate falls because a fall in R makes interest-bearing nonmoney assets less attractive to hold.

Asset Market Equilibrium in the Short Run: The AA Schedule

Figure 7: Output and the Exchange Rate in Asset Market Equilibrium

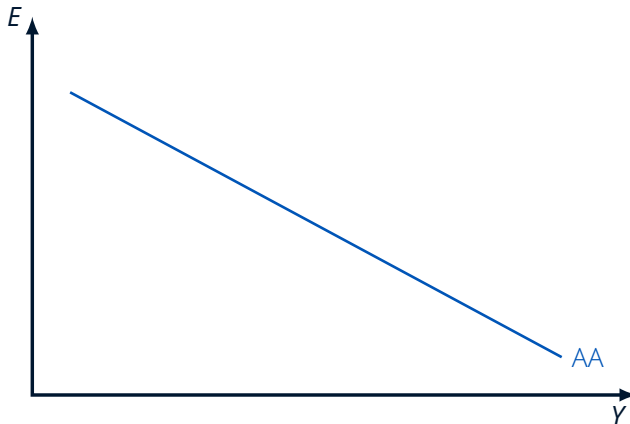


For asset markets to remain in equilibrium:

- A rise in domestic output must be accompanied by an appreciation of the domestic currency.
- A fall in domestic output must be accompanied by a depreciation of the domestic currency.

Asset Market Equilibrium in the Short Run: The AA Schedule

Figure 8: The AA Schedule



Asset Market Equilibrium in the Short Run: The AA Schedule

Factors that Shift the AA Schedule

- Domestic money supply
- Domestic price level
- Expected future exchange rate
- Foreign interest rate
- Shifts in the aggregate real money demand schedule

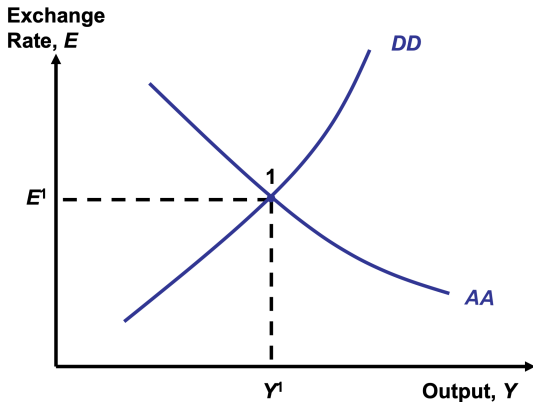
Short-Run Equilibrium for an Open Economy: Putting the DD and AA Schedules Together

Short-Run Equilibrium for an Open Economy: Putting the DD and AA Schedules Together

A short-run equilibrium for the economy as a whole must bring equilibrium simultaneously in the output and asset markets. That is, it must lie on both DD and AA schedules.

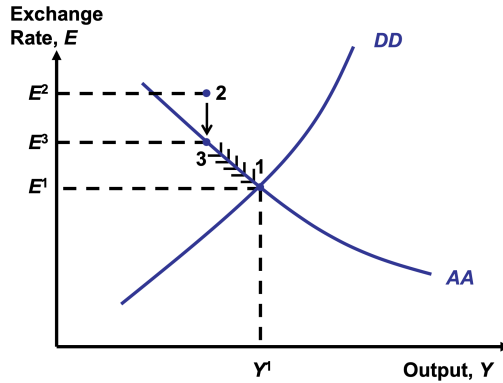
Short-Run Equilibrium for an Open Economy: Putting the DD and AA Schedules Together

Figure 9: Short-Run Equilibrium: The Intersection of DD and AA



Short-Run Equilibrium for an Open Economy: Putting the DD and AA Schedules Together

Figure 10: How the Economy Reaches Its Short-Run Equilibrium



Temporary Changes in Monetary and Fiscal Policy

Temporary Changes in Monetary and Fiscal Policy

Two types of government policy:

- Monetary policy: It works through changes in the money supply.
- Fiscal policy: It works through changes in government spending or taxes.

Some assumptions:

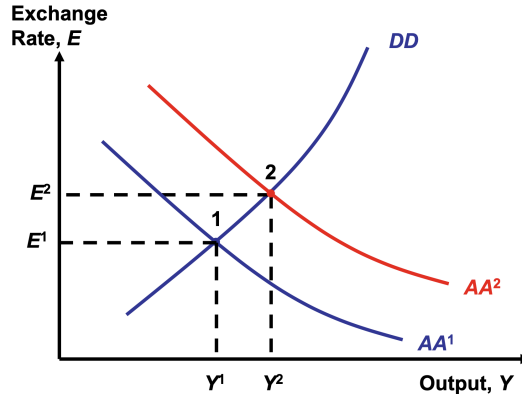
- Temporary policy shifts are those that the public expects to be reversed in the near future and do not affect the long-run expected exchange rate.
- Assume that policy shifts do not influence the foreign interest rate and the foreign price level. (small vs big economies)

Monetary Policy: An increase in money supply (i.e., expansionary monetary policy) raises the economy's output.

- The increase in money supply creates an excess supply of money, which lowers the home interest rate.
- As a result, the domestic currency must depreciate (i.e., home products become cheaper relative to foreign products) and aggregate demand increases.

Temporary Changes in Monetary and Fiscal Policy

Figure 11: Effects of a Temporary Increase in the Money Supply

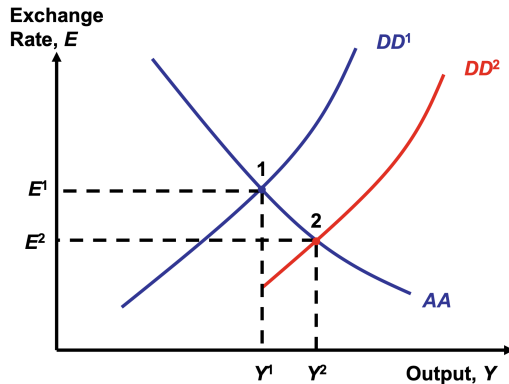


Fiscal Policy: An increase in government spending, a cut in taxes, or some combination of the two (i.e, expansionary fiscal policy) raises output.

- The increase in output raises the transactions demand for real money holdings, which in turn increases the home interest rate.
- As a result, the domestic currency must appreciate.

Temporary Changes in Monetary and Fiscal Policy

Figure 12: Effects of a Temporary Fiscal Expansion

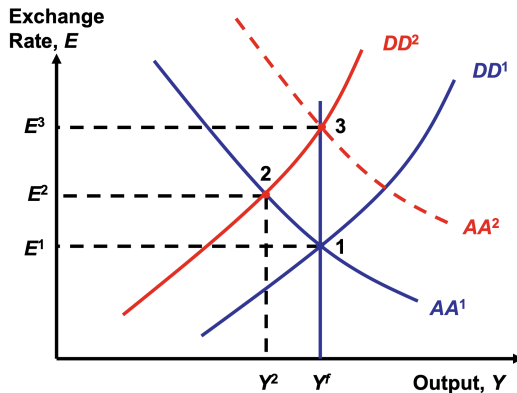


Policies to Maintain Full Employment

- Temporary disturbances that lead to recession can be offset through expansionary monetary or fiscal policies.
- Temporary disturbances that lead to overemployment can be offset through contractionary monetary or fiscal policies.

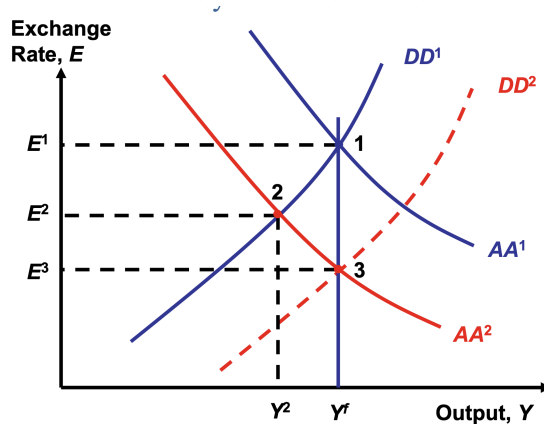
Temporary Changes in Monetary and Fiscal Policy

Figure 13: Maintaining Full Employment After a Temporary Fall in World Demand for Domestic Products



Temporary Changes in Monetary and Fiscal Policy

Figure 14: Policies to Maintain Full Employment After a Money-Demand Increase



Inflation Bias and Other Problems of Policy Formulation

Problems of policy formulation:

Inflation bias

High inflation with no average gain in output that results from governments' policies to prevent recession

To avoid it is relevant to:

- Identify the sources of economic changes
- Identify the durations of economic changes
- Know the impact of fiscal policy on the government budget
- Know time lags in implementing policies

Permanent Shifts in Monetary and Fiscal Policy

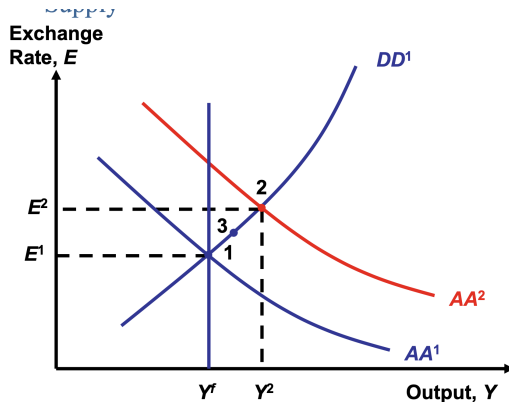
A permanent policy shift affects not only the current value of the government's policy instrument but also the long-run exchange rate.

- This affects expectations about future exchange rates. - A Permanent Increase in the Money Supply
- A permanent increase in the money supply causes the expected future exchange rate to rise proportionally.

As a result, the upward shift in the AA schedule is greater than that caused by an equal, but transitory, increase (compare point 2 with point 3 in figure 14).

Permanent Shifts in Monetary and Fiscal Policy

Figure 15: Short-Run Effects of a Permanent Increase in the Money Supply

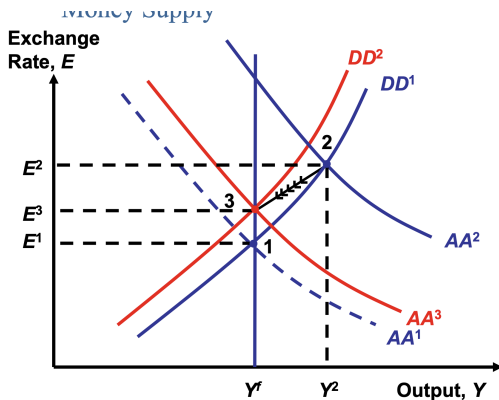


Adjustment to a Permanent Increase in the Money Supply:

- The permanent increase in the money supply raises output above its full-employment level.
- As a result, the price level increases to bring the economy back to full employment.
- Figure 15 shows the adjustment back to full employment.

Permanent Shifts in Monetary and Fiscal Policy

Figure 16: Long-Run Adjustment to a Permanent Increase in the Money Supply

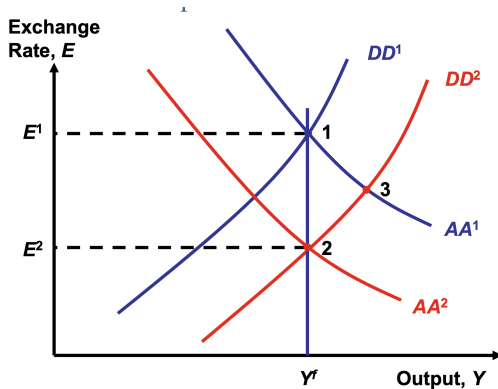


A permanent fiscal expansion changes the long-run expected exchange rate.

- If the economy starts at long-run equilibrium, a permanent change in fiscal policy has no effect on output.
- It causes an immediate and permanent exchange rate jump that offsets exactly the fiscal policy's direct effect on aggregate demand.

Permanent Shifts in Monetary and Fiscal Policy

Figure 17: Effects of a Permanent Fiscal Expansion Changing the Capital Stock



Macroeconomic Policies and the Current Account

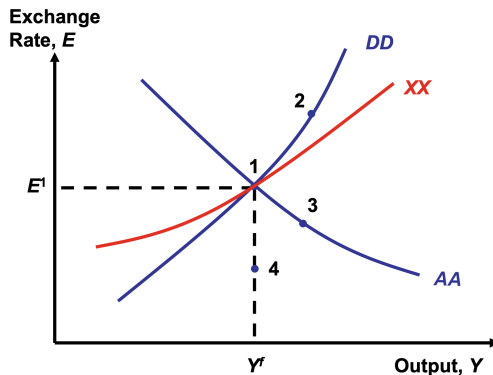
The XX schedule

- It shows combinations of the exchange rate and output at which the **CA** balance would be equal to some desired level.
- It slopes upward because a rise in output encourages spending on imports and thus worsens the current account (if it is not accompanied by a currency depreciation).
- It is flatter than *DD*.

- Monetary expansion causes the **CA** balance to increase in the short run (point 2 in figure -17).
- Expansionary fiscal policy reduces the CA balance.
- If it is temporary, the DD schedule shifts to the right (point 3 in figure 17).
- If it is permanent, both AA and DD schedules shift (point 4 in figure 17).

Macroeconomic Policies and the Current Account Exchange

Figure 18: How Macroeconomic Policies Affect the Current Account Exchange

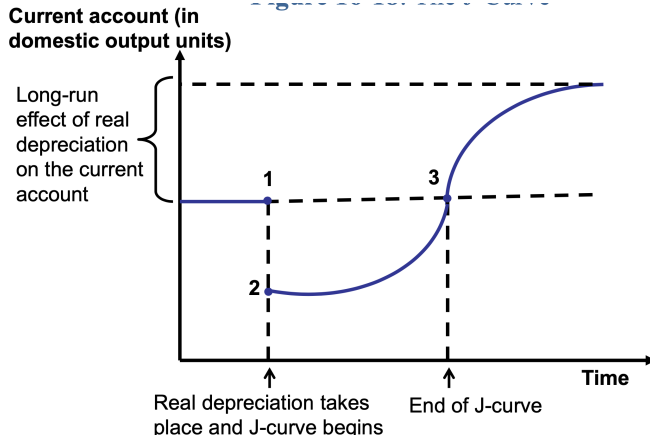


Gradual Trade Flow Adjustment and Current Account Dynamics

The J-Curve

- If imports and exports adjust gradually to real exchange rate changes, the CA may follow a J-curve pattern after a real currency depreciation, first worsening and then improving. Currency depreciation may have a contractionary initial effect on output, and exchange rate overshooting will be amplified.
- It describes the time lag with which a real currency depreciation improves the CA.

Figure 19: The J-Curve



Gradual Trade Flow Adjustment and Current Account Dynamics: Exchange Rate Pass-Through and Inflation

The **CA** in the DD-AA model has assumed that nominal exchange rate changes cause proportional changes in the real exchange rates in the short run.

Degree of Pass-through

- It is the percentage by which import prices rise when the home currency depreciates by 1
- In the DD-AA model, the degree of pass-through is 1.
- Exchange rate pass-through can be incomplete because of international market segmentation.
- Currency movements have less-than-proportional effects on the relative prices determining trade volumes.

Summary

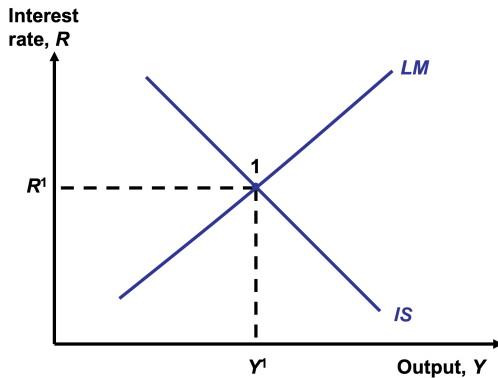
- The aggregate demand for an open economy's output consists of four components: consumption demand, investment demand, government demand, and the current account.
- Output is determined in the short run by the equality of aggregate demand and aggregate supply.
- The economy's short-run equilibrium occurs at the exchange rate and output level.

- A temporary increase in the money supply causes a depreciation of the currency and a rise in output.
- Permanent shifts in the money supply cause sharper exchange rate movements and therefore have stronger short-run effects on output than transitory shifts.
- If exports and imports adjust gradually to real exchange rate changes, the current account may follow a J-curve pattern after a real currency depreciation, first worsening and then improving.

Appendix I: The IS-LM Model and the DD-AA Model

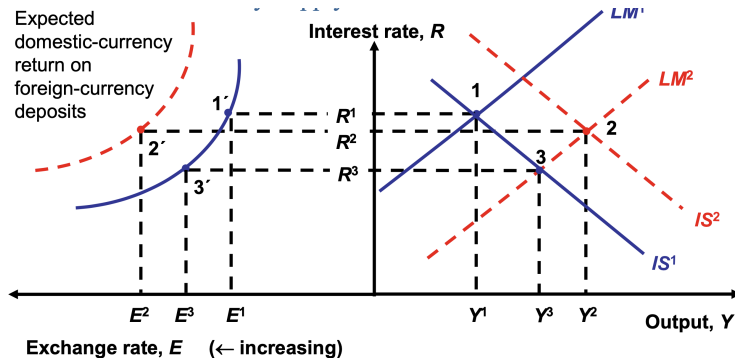
Appendix I: The IS-LM Model and the DD-AA Model

Figure 20: Short-Run Equilibrium in the IS-LM Model



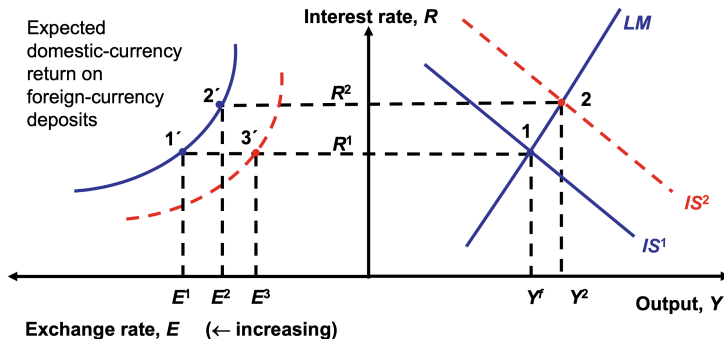
Appendix I: The IS-LM Model and the DD-AA Model

Figure 21: Effects of Permanent and Temporary Increases in the Expected domestic-currency



Appendix I: The IS-LM Model and the DD-AA Model

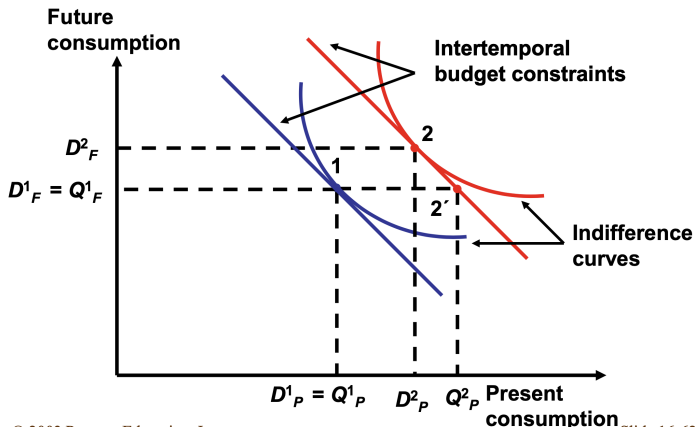
Figure 22: Effects of Permanent and Temporary Fiscal Expansions in the IS-LM Model



Appendix II: Intertemporal Trade and Consumption Demand

Appendix II: Intertemporal Trade and Consumption Demand

Figure 23: Change in Output and Saving Future consumption



Appendix III: The Marshall-Lerner Condition and Empirical Estimates of Trade Elasticities

Appendix III: The Marshall-Lerner Condition and Empirical Estimates of Trade Elasticities

Table 2: Estimated Price Elasticities for International Trade in Manufactured Goods

Country	η			η^*		
	Impact	Short-run	Long-run	Impact	Short-run	Long-run
Austria	0.39	0.71	1.37	0.03	0.36	0.80
Belgium	0.18	0.59	1.55	—	—	0.70
Britain	—	—	0.31	0.60	0.75	0.75
Canada	0.08	0.40	0.71	0.72	0.72	0.72
Denmark	0.82	1.13	1.13	0.55	0.93	1.14
France	0.20	0.48	1.25	—	0.49	0.60
Germany	—	—	1.41	0.57	0.77	0.77
Italy	—	0.56	0.64	0.94	0.94	0.94
Japan	0.59	1.01	1.61	0.16	0.72	0.97
Netherlands	0.24	0.49	0.89	0.71	1.22	1.22
Norway	0.40	0.74	1.49	—	0.01	0.71
Sweden	0.27	0.73	1.59	—	—	0.94
Switzerland	0.28	0.42	0.73	0.25	0.25	0.25
United States	0.18	0.48	1.67	—	1.06	1.06

Note: Estimates are taken from Jacques R. Artus and Malcolm D. Knight, *Issues in the Assessment of the Exchange Rates of Industrial Countries*, Occasional Paper 29, Washington, D.C.: International Monetary Fund, July 1984, Table 4. Unavailable estimates are indicated by dashes.