Lecture 5: Intermediate macroeconomics, autumn 2009

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Topics

- **Absolute and relative purchasing power parity (PPP)**
- **The Balassa-Samuelson effect**
- **The monetary approach to the exchange rate**
- **The Fisher effect**
- **The real exchange rate**
- **The relationship between the real exchange rate and the current account**
- **The Marshall-Lerner condition and the J-curve**
- **Short-run equilibrium in a small open economy with a flexible exchange rate (the AA-DD model)**
- **Stabilisation policy in the AA-DD model**

Literature: Krugman-Obstfeld chapters 15 and 16

Purchasing Power parity (PPP)

- **Theory of long-run exchange rate determination**
- **Focus on the importance of goods markets (as opposed to asset markets)**
- **Developed by Swedish economist Gustaf Cassel (1866-1945) in 1920**

Law of one price for a single good *i*:

$$P^i_{US} = E_{\$/€} \, g P^i_E$$

$$E_{\$/€} = P^i_{US} \; / \; P^i_E$$

Absolute PPP:

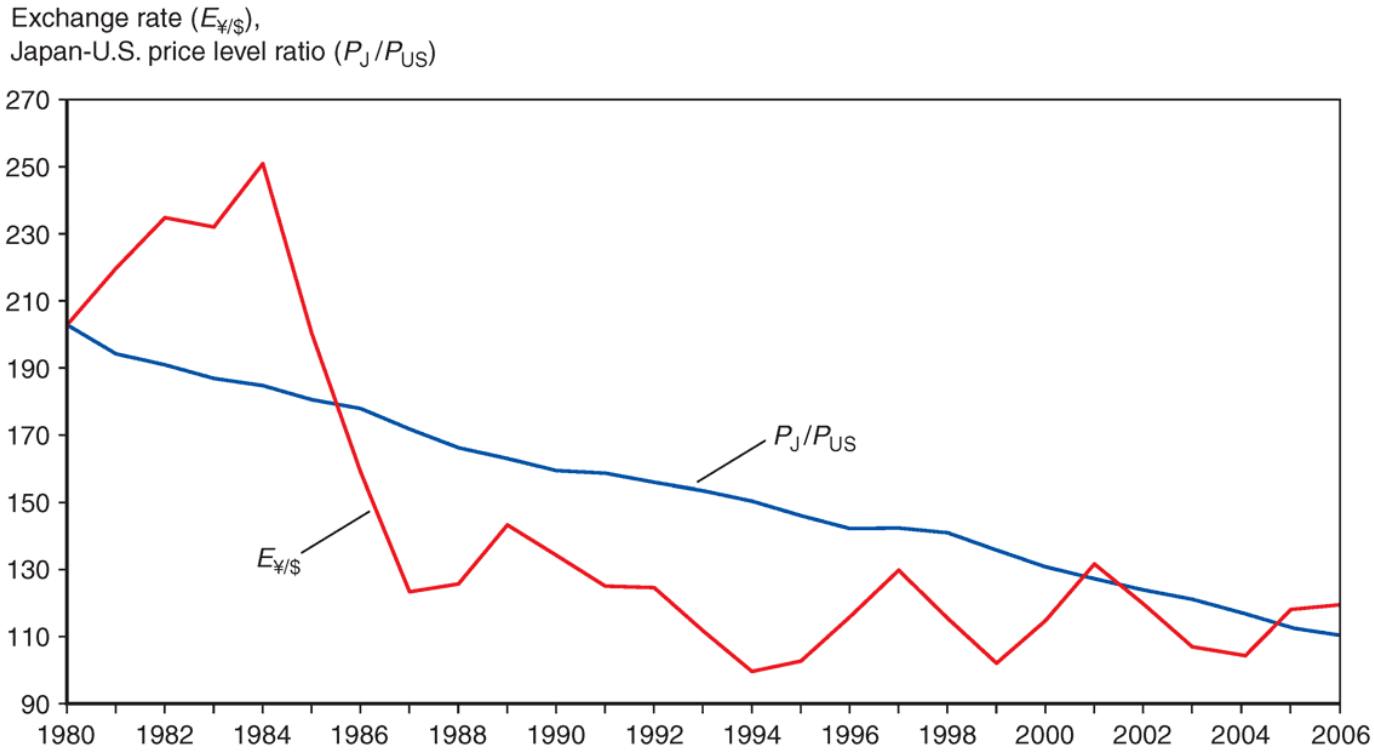
$$E_{\$/€} = P_{US} \; / \; P_E$$

Relative PPP:

$$(E_{\$/€,\, t} - E_{\$/€,\, t\text{-}1}) \; / \; E_{\$/€,\, t\text{-}1} = \pi_{US,\, t} - \pi_{E,\, t}$$

$$\pi_t = (P_t - P_{t\text{-}1}) \; / \; P_{t\text{-}1}$$

Fig. 15-2: The Yen/Dollar Exchange Rate and Relative Japan-U.S. Price Levels, 1980–2006



Source: IMF, *International Financial Statistics*. Exchange rates and price levels are end-of-year data.

Causes of deviations from PPP

1. **Transport costs and trade barriers**
2. **Differences in consumption baskets**
3. **Imperfect competition – price discrimination - pricing to market**

Different types of goods and services

- **Tradables or traded goods**
- **Non-tradables or non-traded goods (primarily services and building)**

The Balassa-Samuelson effect

The price level is higher in countries with high per capita income, because prices of non-tradables are higher.

(1) $P_T = EP_T^*$ **(international goods arbitrage)**

(2) $W_T = P_T \cdot MPL_T$ **(profit maximisation in tradables sector)**

(3) $W_N = W_T$ **(homogenous labour market)**

(4) $P_N = W_N / MPL_N$ **(price = marginal cost for non-tradables)**

(5) $P_C = P_T^{\alpha} P_N^{1-\alpha}$ **(consumer price index)**

The Balassa-Samuelson effect implies a higher relative price for non-tradables in rich than in poor countries:

Substitutions from the above equations imply:

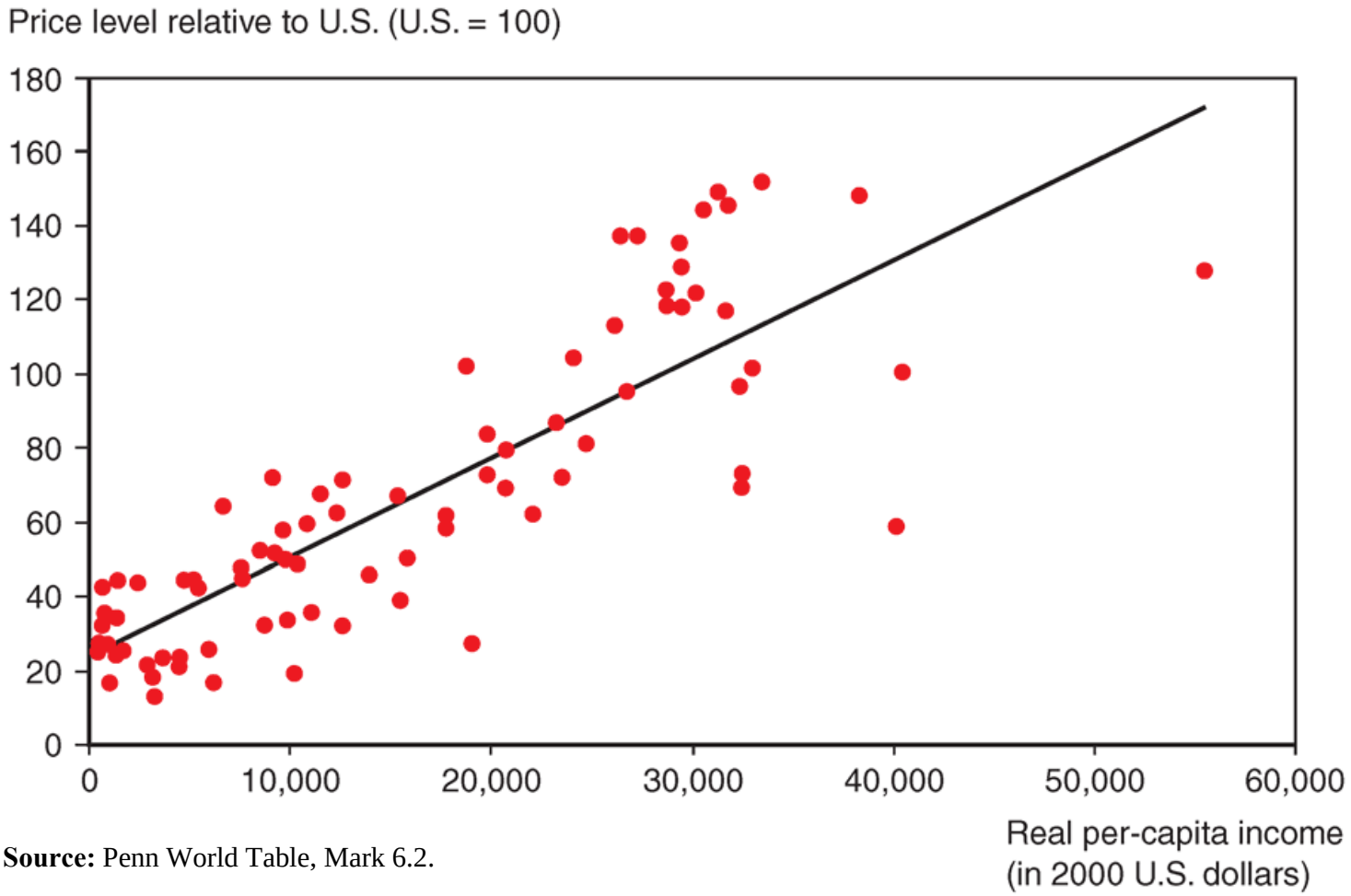
$$\frac{P_N}{P_T} = \frac{1}{P_T} \cdot \frac{W_N}{MPL_N} = \frac{1}{P_T} \cdot \frac{W_T}{MPL_N} = \frac{P_T \cdot MPL_T}{P_T \cdot MPL_N} = \frac{MPL_T}{MPL_N}$$

$$\frac{MPL_T}{MPL_N} \uparrow \Rightarrow \frac{P_N}{P_T} \uparrow$$

The Balassa-Samuelson effect cont.

- **Compare countries with the same currency (for example countries in the euro area)**
- **P_T is the same everywhere because of goods arbitrage**
- **MPL_T is higher in rich than in poor countries (more real and human capital gives higher productivity).**
- **Higher MPL_T implies higher $W_T = P_T \cdot MPL_T$.**
- **A homogenous labour market implies $W_N = W_T$**
- **Differences in MPL_N (the marginal product of labour in the non-tradables sector) between countries are small (a hair cut takes more or less the same time everywhere)**
- **Because $P_N = W_N / MPL_N$, the price level for non-tradables must be higher in rich than in poor countries**
- **Hence P_C (CPI) must be higher.**

Fig. 15-3: Price Levels and Real Incomes, 2004



Source: Penn World Table, Mark 6.2.

The Balassa-Samuelson effect cont.

- **According to the catching-up hypothesis growth is higher in poor than in rich countries**
- **The main difference in growth is higher productivity growth in the tradables sector (manufacturing)**
- **Poor countries with high growth tend to have higher inflation that rich: with a common currency (fixed exchange rates), Estonia and Latvia will have higher inflation than Germany.**

Higher inflation in poor than in rich countries

(1) $$\frac{\Delta P_T}{P_T} = \frac{\Delta E}{E} + \frac{\Delta P_T^*}{P_T}$$

(2) $$\frac{\Delta W_T}{W_T} = \frac{\Delta P_T}{P_T} + \frac{\Delta MPL_T}{MPL_T}$$

(3) $$\frac{\Delta W_N}{W_N} = \frac{\Delta W_T}{W_T}$$

(4) $$\frac{\Delta P_N}{P_N} = \frac{\Delta W_N}{W_N} - \frac{\Delta MPL_N}{MPL_N}$$

(5) $$\frac{\Delta P_C}{P_C} = \alpha\frac{\Delta P_T}{P_T} + (1-\alpha)\frac{\Delta P_N}{P_N} = \alpha\frac{\Delta P_T}{P_T} + (1-\alpha)\left\{\frac{\Delta W_N}{W_N} - \frac{\Delta MPL_N}{MPL_N}\right\} =$$

$$= \alpha\frac{\Delta P_T}{P_T} + (1-\alpha)\left\{\frac{\Delta W_T}{W_T} - \frac{\Delta MPL_N}{MPL_N}\right\} = \alpha\frac{\Delta P_T}{P_T} + (1-\alpha)\left\{\frac{\Delta P_T}{P_T} + \frac{\Delta MPL_T}{MPL_T} - \frac{\Delta MPL_N}{MPL_N}\right\} =$$

$$= \frac{\Delta P_T}{P_T} + (1-\alpha)\left\{\frac{\Delta MPL_T}{MPL_T} - \frac{\Delta MPL_N}{MPL_N}\right\}$$

Arithmetical illustration of Balassa-Samuelson effect

$$\frac{\Delta P_T}{P_T} = 0$$

$$\frac{\Delta MPL_N}{MPL_N} = 1\ \%$$

$$\alpha = 0.5$$

Estonia

$$\frac{\Delta MPL_T}{MPL_T} = 8\ \%$$

$$\frac{\Delta P_C}{P_C} = \alpha\frac{\Delta P_T}{P_T} + (1-\alpha)\left\{\frac{\Delta MPL_T}{MPL_T} - \frac{\Delta MPL_N}{MPL_N}\right\} = 0 + 0.5\ (8\text{-}1) = 3.5\ \%$$

Germany

$$\frac{\Delta MPL_T}{MPL_T} = 4\ \%$$

$$\frac{\Delta P_C}{P_C} = \alpha\frac{\Delta P_T}{P_T} + (1-\alpha)\left\{\frac{\Delta MPL_T}{MPL_T} - \frac{\Delta MPL_N}{MPL_N}\right\} = 0 + 0.5\ (4\text{-}1) = 1.5\ \%$$

- **Inflation should be about 2 percentage points higher in Estonia than in Germany because of higher growth.**

The monetary approach to the exchange rate

$$E = P_{US} \; / \; P_E$$

$$P_{US} = M^S_{US} \; / \; L\,(R_{\$},\, Y_{US})$$

$$P_E = M^S_E \; / \; L\,(R_{€},\, Y_E)$$

The fundamental exchange rate equation

$$E = P_{US} \; / \; P_E = (M^S_{US} \; / \; M^S_E) \bullet [L(R_{€},\, Y_E) \; / \; L(R_{\$},\, Y_{US})]$$

An increase in money supply in the US relative to Europe ($M^S_{US} \; / \; M^S_E \uparrow$) causes a nominal depreciation of the dollar ($E\uparrow$).

The Fisher effect

(1) $R_{\$} = R_{€} + (E^e - E) / E$ **Interest rate parity**

(2) $\frac{E^e - E}{E} = \pi^e_{US} - \pi^e_E$ **Relative PPP**

Substitution of (2) in (1):

$R_{\$} - R_{€} = \pi^e_{US} - \pi^e_E$

The Fisher effect: a 1 percentage point rise in inflation in one country causes a 1 percentage point increase in the nominal interest rate.

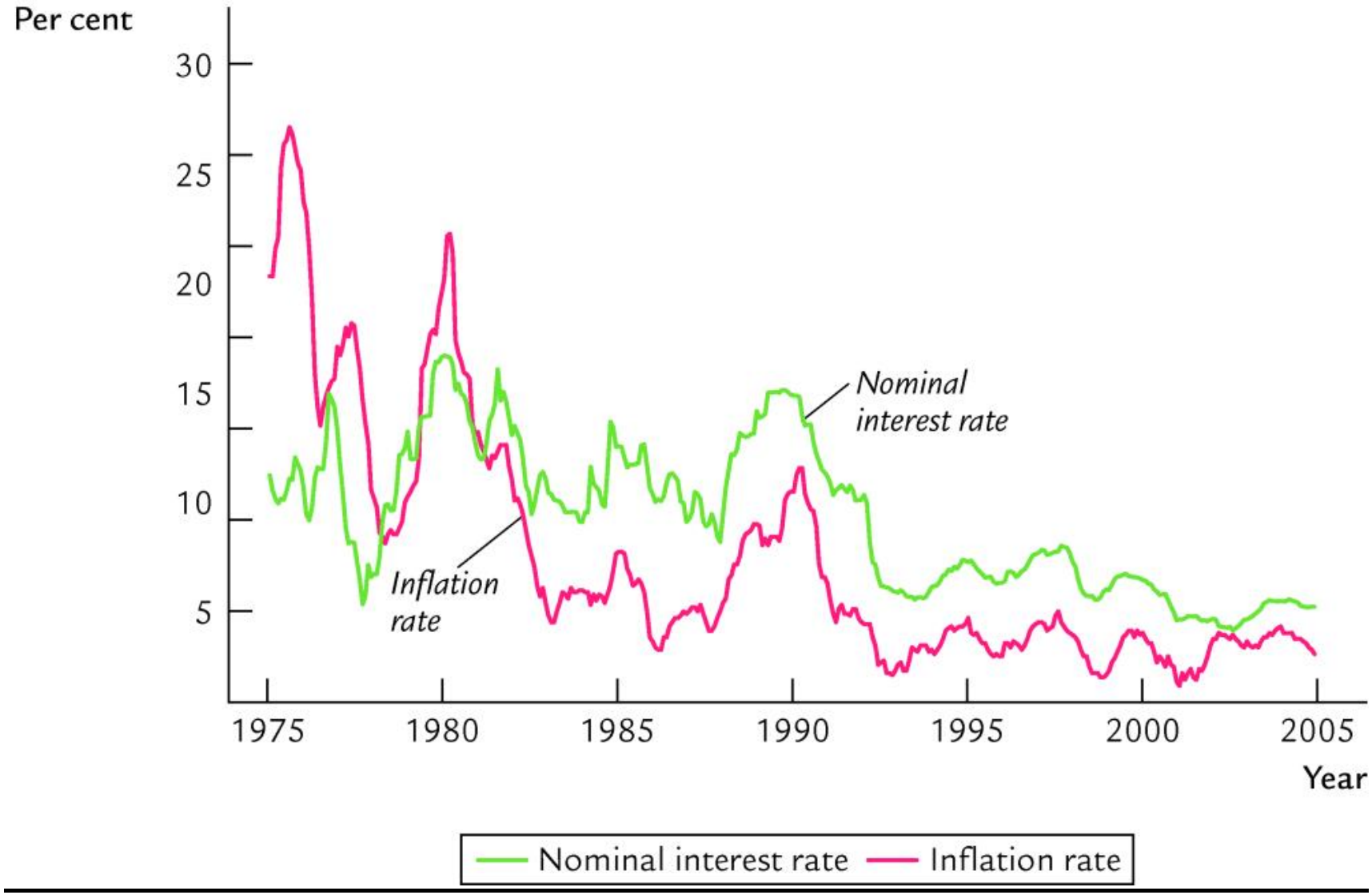
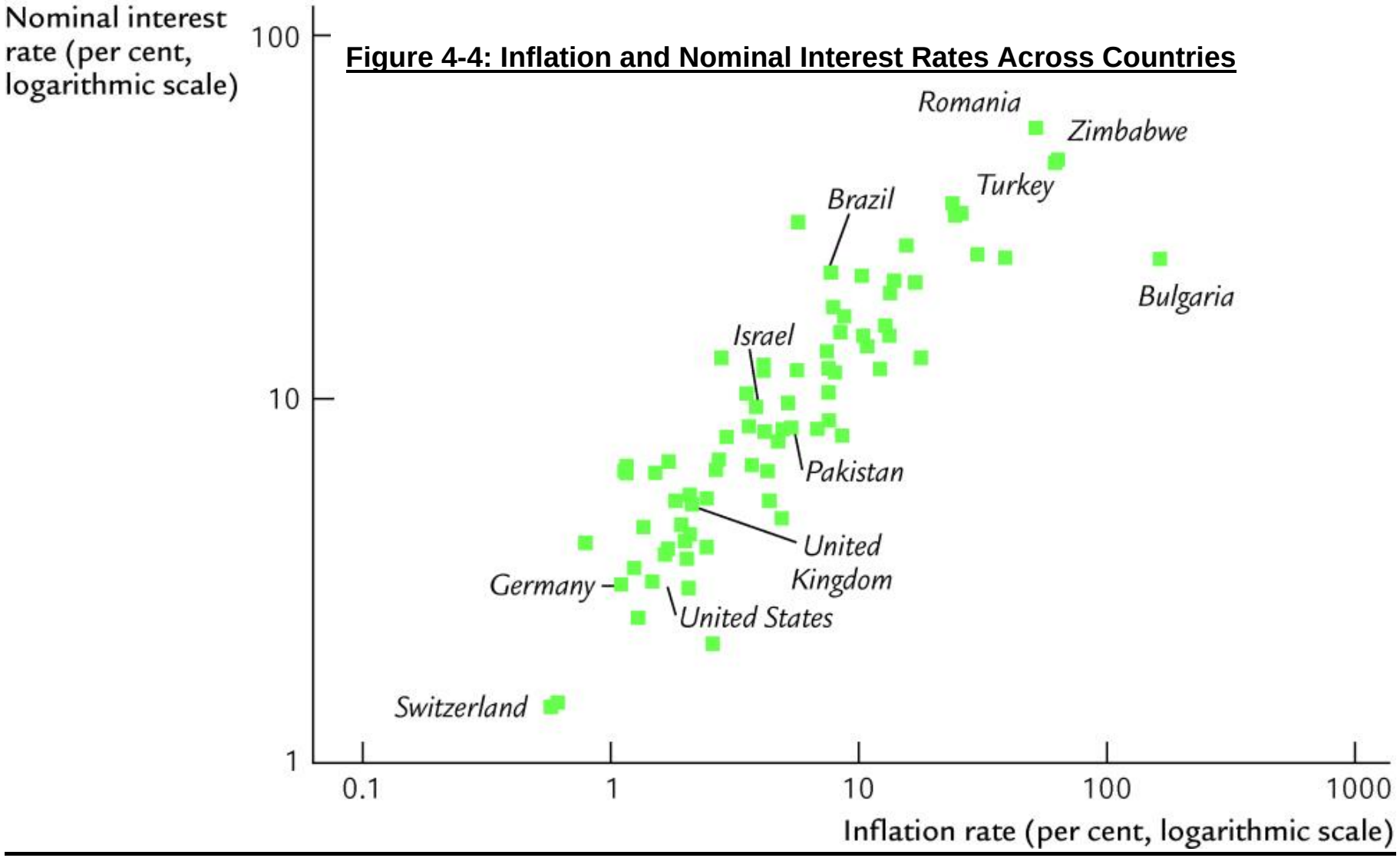


Figure 4-3: Inflation and Nominal Interest Rates Over Time

Figure 4-4: Inflation and Nominal Interest Rates Across Countries



Interest rate differentials and real exchange rate changes

Definition of real exchange rate: $q = EP_E / P_{US}$

Expected real exchange rate change:

$$(q^e - q) / q = (E^e - E) / E + \pi^e_E - \pi^e_{US}$$

Interest rate parity: $(E^e - E) / E = R_\$ - R_€$

Substitution implies:

$$(q^e - q) / q = R_\$ - R_€ + \pi^e_E - \pi^e_{US}$$

$$R_\$ - R_€ = \pi^e_{US} - \pi^e_E + (q^e - q) / q$$

Nominal interest rate differential = inflation differential + real depreciation

$$(R_\$ - \pi^e_{US}) - (R_€ - \pi^e_E) = (q^e - q) / q$$

$$r^e_{US} - r^e_E = (q^e - q) / q$$

***r* = real interest rate**

Real interest rate differential = real depreciation (this is called real interest rate parity)

A short-run general equilibrium model for an open economy with a flexible exchange rate

Aggregate demand for domestically produced goods

$D = C + G + I + CA$

$C = C(Y - T)$	**Consumption function**
$G = \overline{G}$	**Exogenous government expenditure**
$T = \overline{T}$	**Exogenous lump-sum tax**
$I = \overline{I}$	**Exogenous investment**

$CA = EX - IM = EX - qIM^*$

The current account (net exports) should be measured in terms of the same numéraire (here domestic goods). So *IM* is imports measured in terms of domestic goods. *IM is imports measured in terms of foreign goods.**

$EX = EX(q, Y^*)$

$IM^* = IM^*(q, Y - T)$

$CA = EX(q, Y^*) - qIM^*(q, Y - T) = CA(q, Y^*, Y - T)$

A real depreciation ($q\uparrow$) need not improve the current account ($CA\uparrow$). Volume effects on exports and imports work in this direction, but the value effect on imports works in the reverse direction.

Marshall-Lerner condition

A real depreciation will increase net exports if the Marshall-Lerner condition holds.

The price elasticity of exports + the price elasticity of imports > 1

Then the volume effects dominate the value effect for imports.

All elasticities are defined to be positive.

Mathematical derivation of Marshall-Lerner condition

$$CA(q,\ Y^*,\ Y-T) = EX(q,\ Y^*) - qIM^*(q,\ Y-T)$$

Wanted: a condition for when $\frac{dCA}{dq} > 0$

Recall the rule of differentiation for a product

$$\frac{d\left[v(x)u(x)\right]}{dx} = v_x(x)u(x) + u_x(x)v(x)$$

This implies that $d\frac{\left\{qIM^*(q,\ Y-T)\right\}}{dq} = IM^*(q,\ Y-T) + qIM_q^*(q,\ Y-T)$

Hence: $\frac{dCA}{dq} = EX_q - IM^* - qIM_q^*$

Multiply the equation by *q/EX*.

$$\frac{q}{EX} \bullet \frac{dCA}{dq} = \frac{qEX_q}{EX} - \frac{q^2IM_q^*}{EX} - \frac{qIM^*}{EX}$$

Assume that *CA* = 0 initially, so that *EX* = *qIM*=IM*. Then:

$$\frac{q}{EX} \bullet \frac{dCA}{dq} = \frac{qEX_q}{EX} - \frac{qIM_q^*}{IM^*} - 1$$

$$\frac{dCA}{dq} > 0 \Leftrightarrow \frac{qEX_q}{EX} - \frac{qIM_q^*}{IM^*} > 1$$

$\frac{qEX_q}{EX} = \frac{q}{EX} \bullet \frac{\partial EX}{\partial q} = \eta =$ **price elasticity of exports**

$-\frac{qIM_q^*}{IM^*} = -\frac{q}{IM^*} \bullet \frac{\partial IM^*}{\partial q} = \eta^* =$ **price elasticity of imports**

All price elasticities have been defined so that they are positive.

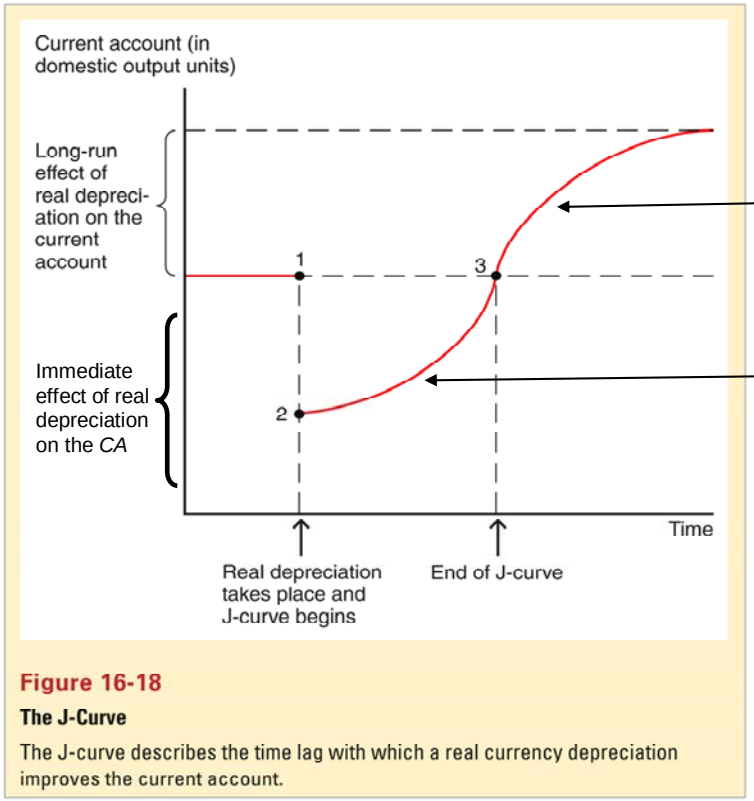
$\because\ \eta + \eta^* > 1 \Leftrightarrow dCA/dq > 0.$

TABLE 16A2-1 Estimated Price Elasticities for International Trade in Manufactured Goods

	η			η^*		
Country	**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.

Value Effect, Volume Effect and the J-Curve (cont.)



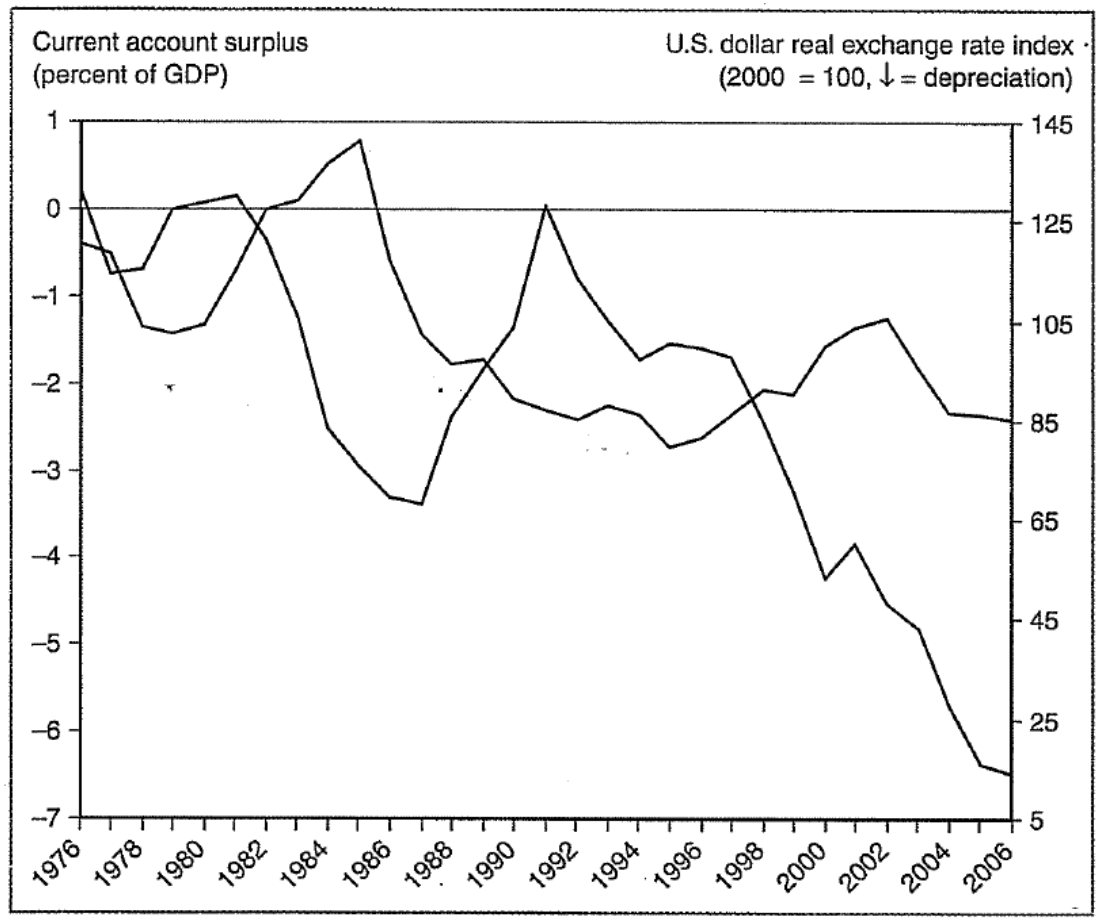
volume effect dominates value effect

J-curve: value effect dominates volume effect

Figure 16-18

The J-Curve

The J-curve describes the time lag with which a real currency depreciation improves the current account.



The U.S. Current Account and the Dollar's Real Exchange Rate, 1976–2006
The dollar typically appreciates as a large current account deficit emerges, but it depreciates afterward.

Source: International Monetary Fund, *International Financial Statistics.*

Aggregate demand

Aggregate demand is given by:

$$D = C(Y-T) + G + I + CA\left(\frac{EP^*}{P}, Y^*, Y-T\right) \Rightarrow$$

This implies:

$$D = D\left(\frac{EP^*}{P}, Y-T, G, I, Y^*\right)$$

$$\frac{EP^*}{P}\uparrow \Rightarrow D\uparrow$$

$$Y-T\uparrow \Rightarrow D\uparrow$$

$$G\uparrow \Rightarrow D\uparrow$$

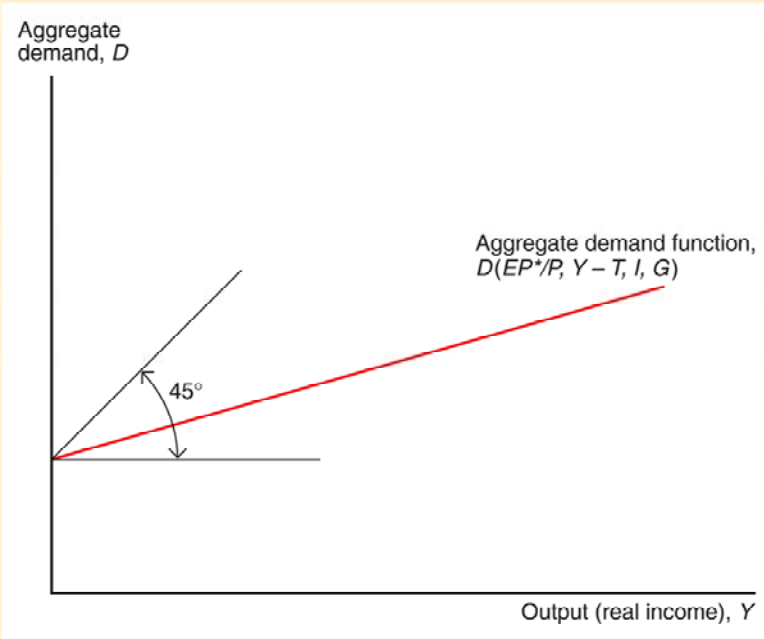
$$I\uparrow \Rightarrow D\uparrow$$

$$Y^*\uparrow \Rightarrow D\uparrow$$

Figure 16-1

Aggregate Demand as a Function of Output

Aggregate demand is a function of the real exchange rate (EP^*/P), disposable income ($Y - T$), investment demand (I), and government spending (G). If all other factors remain unchanged, a rise in output (real income), Y, increases aggregate demand. Because the increase in aggregate demand is less than the increase in output, the slope of the aggregate demand function is less than 1 (as indicated by its position within the 45-degree angle).

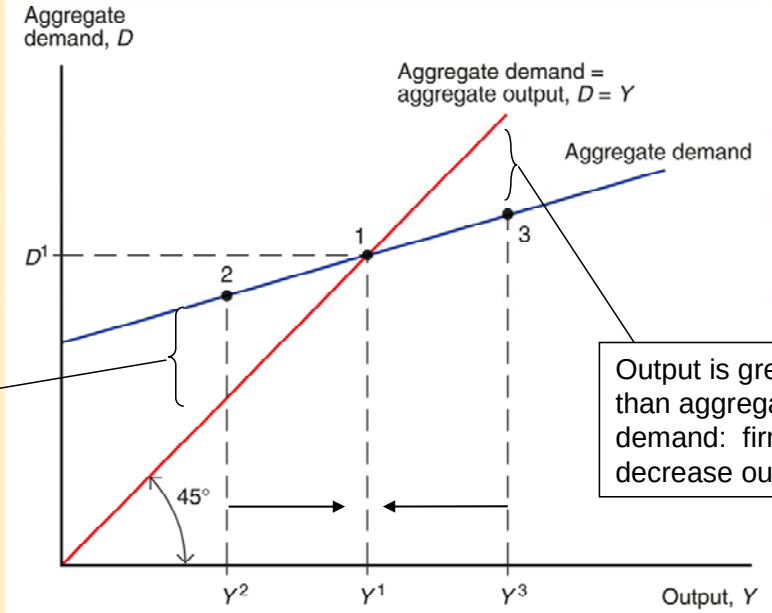


Short Run Equilibrium for Aggregate Demand and Output (cont.)

Figure 16-2

The Determination of Output in the Short Run

In the short run output settles at Y^1 (point 1), where aggregate demand, D^1, equals aggregate output, Y^1.



Aggregate demand is greater than production: firms increase output

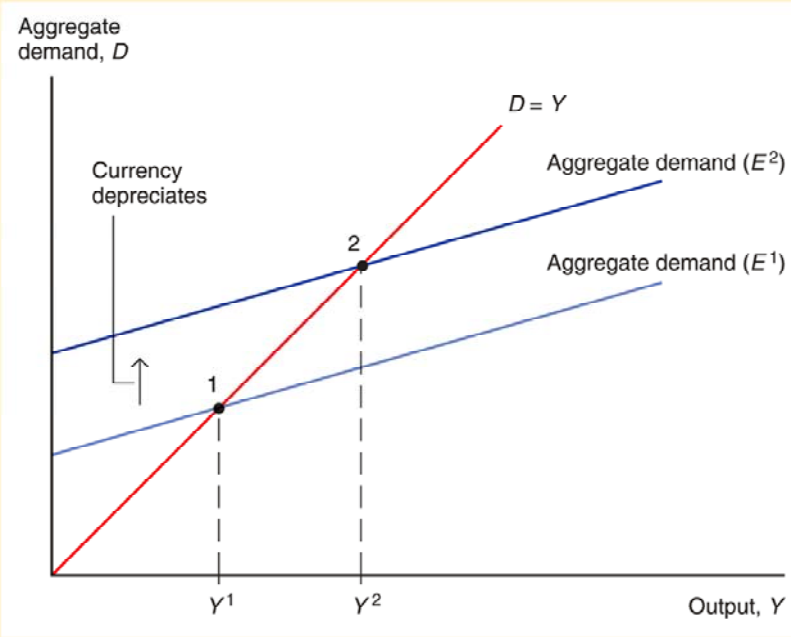
Output is greater than aggregate demand: firms decrease output

Short Run Equilibrium and the Exchange Rate: *DD* Schedule (cont.)

Figure 16-3

Output Effect of a Currency Depreciation with Fixed Output Prices

A rise in the exchange rate from E^1 to E^2 (a currency depreciation) raises aggregate demand to *aggregate demand* (E^2) and output to Y^2, all else equal.

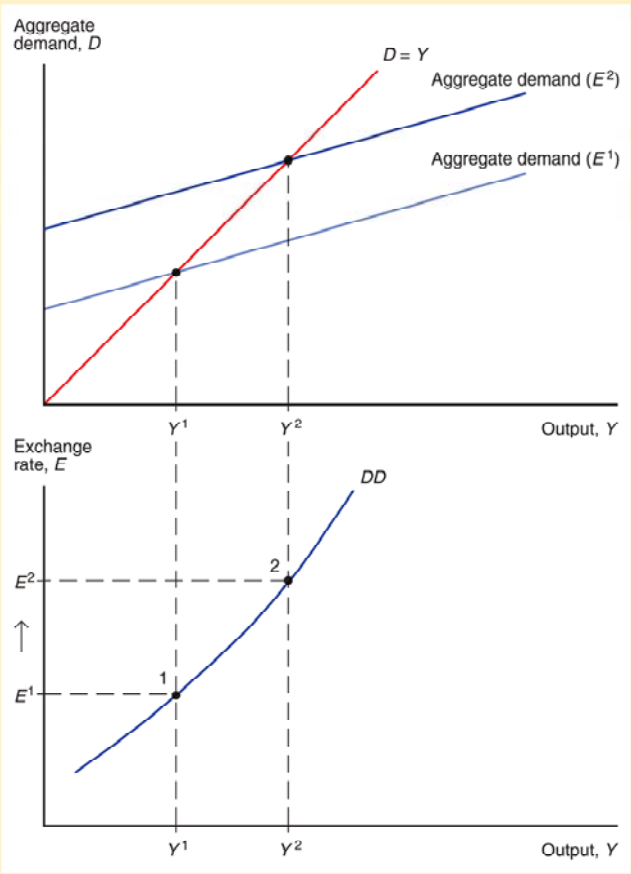


Short Run Equilibrium and the Exchange Rate: *DD* Schedule (cont.)

Figure 16-4

Deriving the *DD* Schedule

The *DD* schedule (shown in the lower panel) slopes upward because a rise in the exchange rate from E^1 to E^2, all else equal, causes output to rise from Y^1 to Y^2.



Shifting the *DD* Curve (cont.)

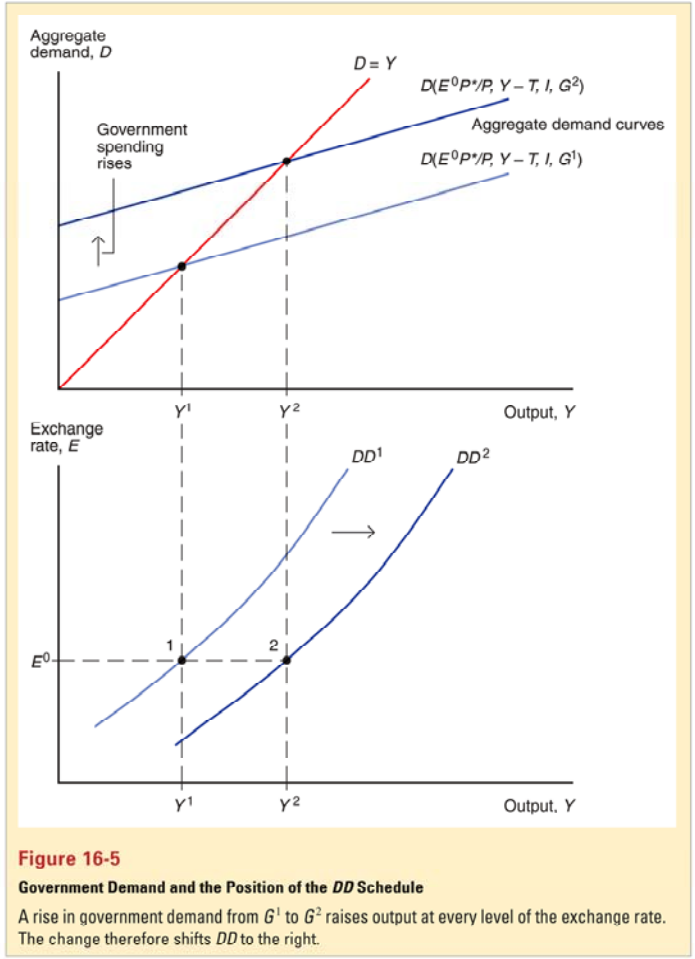


Figure 16-5

Government Demand and the Position of the *DD* Schedule

A rise in government demand from G^1 to G^2 raises output at every level of the exchange rate. The change therefore shifts *DD* to the right.

Changes shifting the DD-curve to the right

1. **An increase in government expenditure ($G\uparrow$)**
2. **A reduction in the tax ($T\downarrow$)**
3. **An increase in investment ($I\uparrow$)**
4. **A reduction in the domestic price level ($P\downarrow$)**
5. **An increase in the foreign price level ($P^*\uparrow$)**
6. **An increase in foreign income ($Y^*\uparrow$)**
7. **A reduction in the savings rate ($s\downarrow$)**
8. **A shift in expenditure from foreign to domestic goods (increased relative demand for domestic goods)**

Equilibrium in asset markets

1. Foreign currency market (interest rate parity)

$$R = R^* + (E^e - E)/E$$

2. Money market

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

Short Run Equilibrium for Assets (cont.)

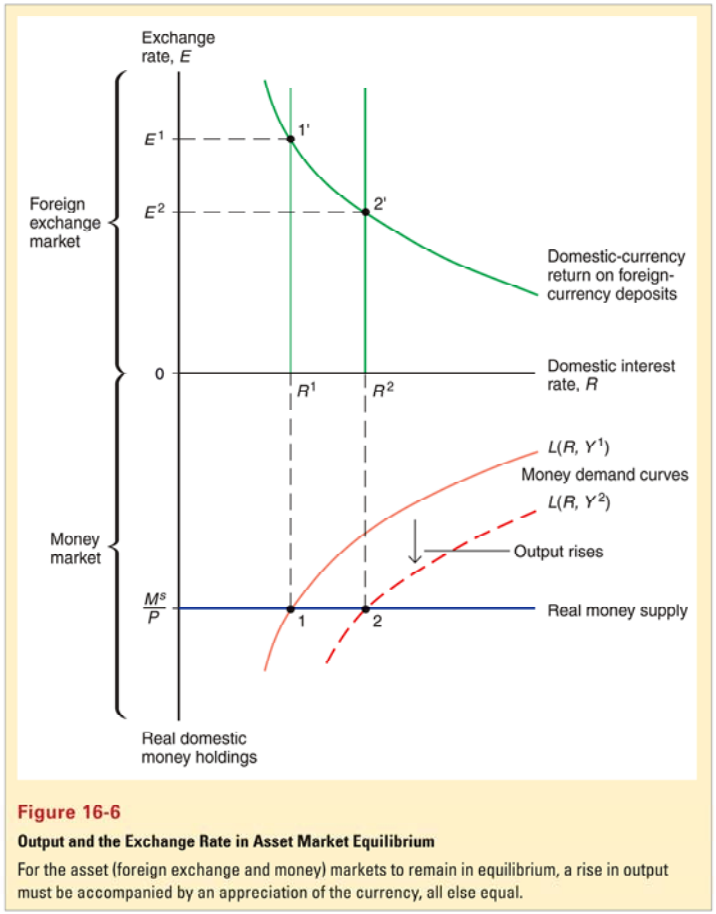


Figure 16-6

Output and the Exchange Rate in Asset Market Equilibrium

For the asset (foreign exchange and money) markets to remain in equilibrium, a rise in output must be accompanied by an appreciation of the currency, all else equal.

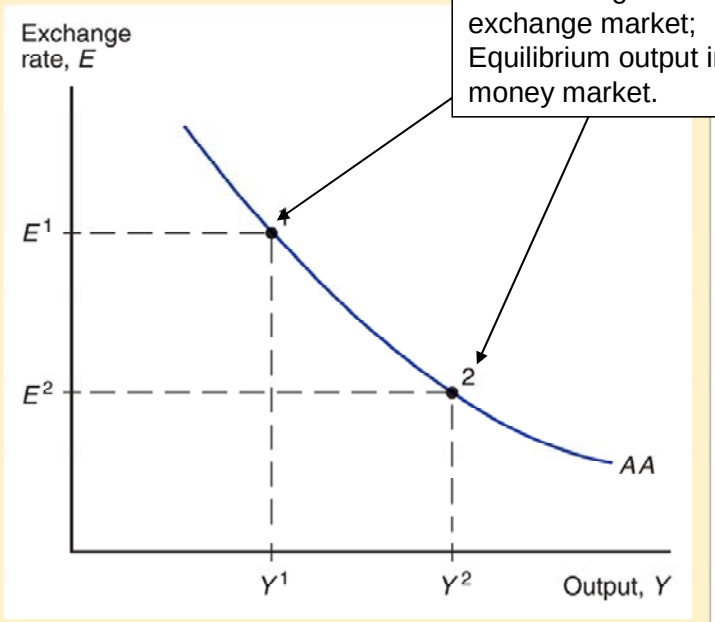
Short Run Equilibrium for Assets: *AA* Curve (cont.)

Equilibrium exchange rate in foreign exchange market; Equilibrium output in money market.

Figure 16-7

The *AA* Schedule

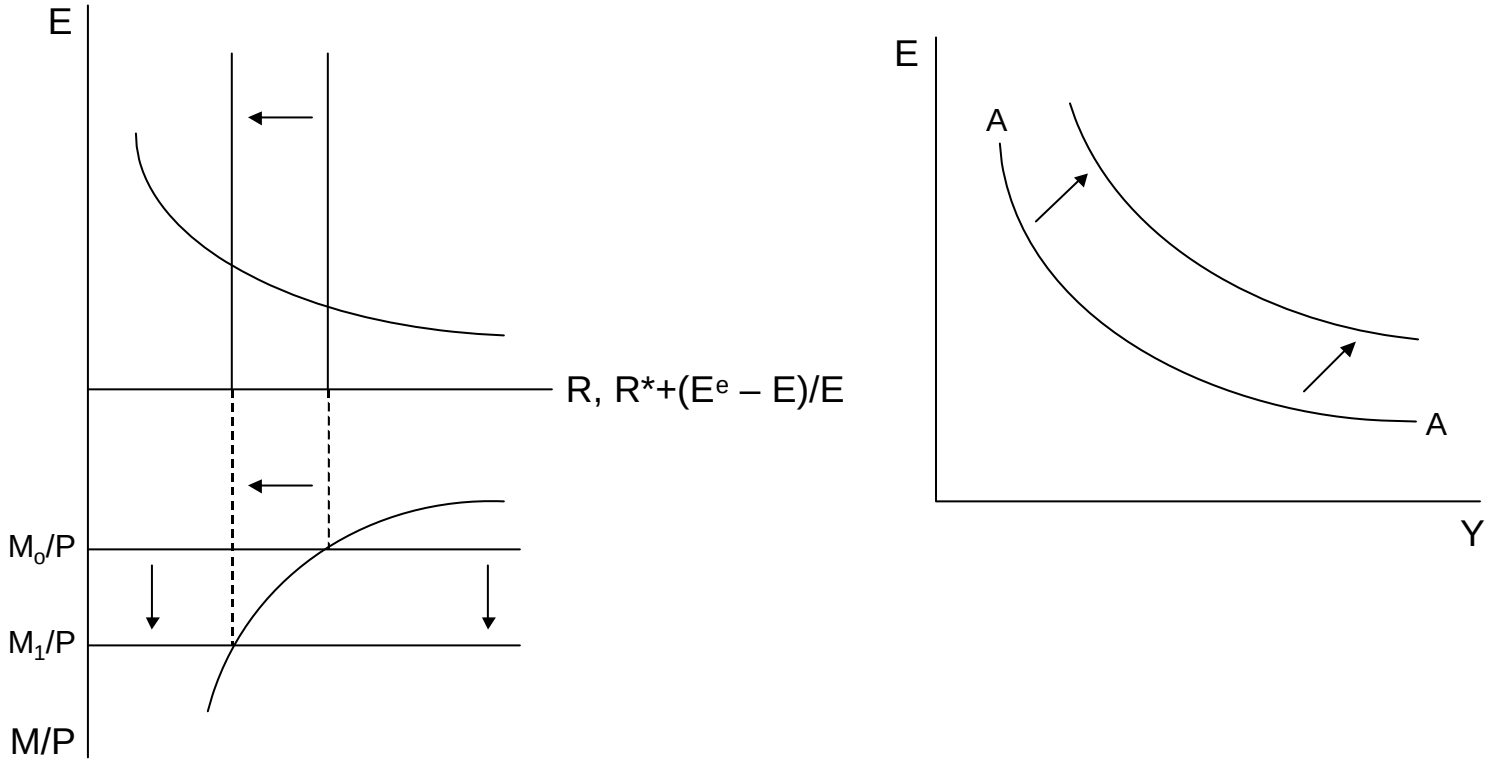
The asset market equilibrium schedule *AA* slopes downward because a rise in output from Y^1 to Y^2, all else equal, causes a rise in the home interest rate and a domestic currency appreciation from E^1 to E^2.



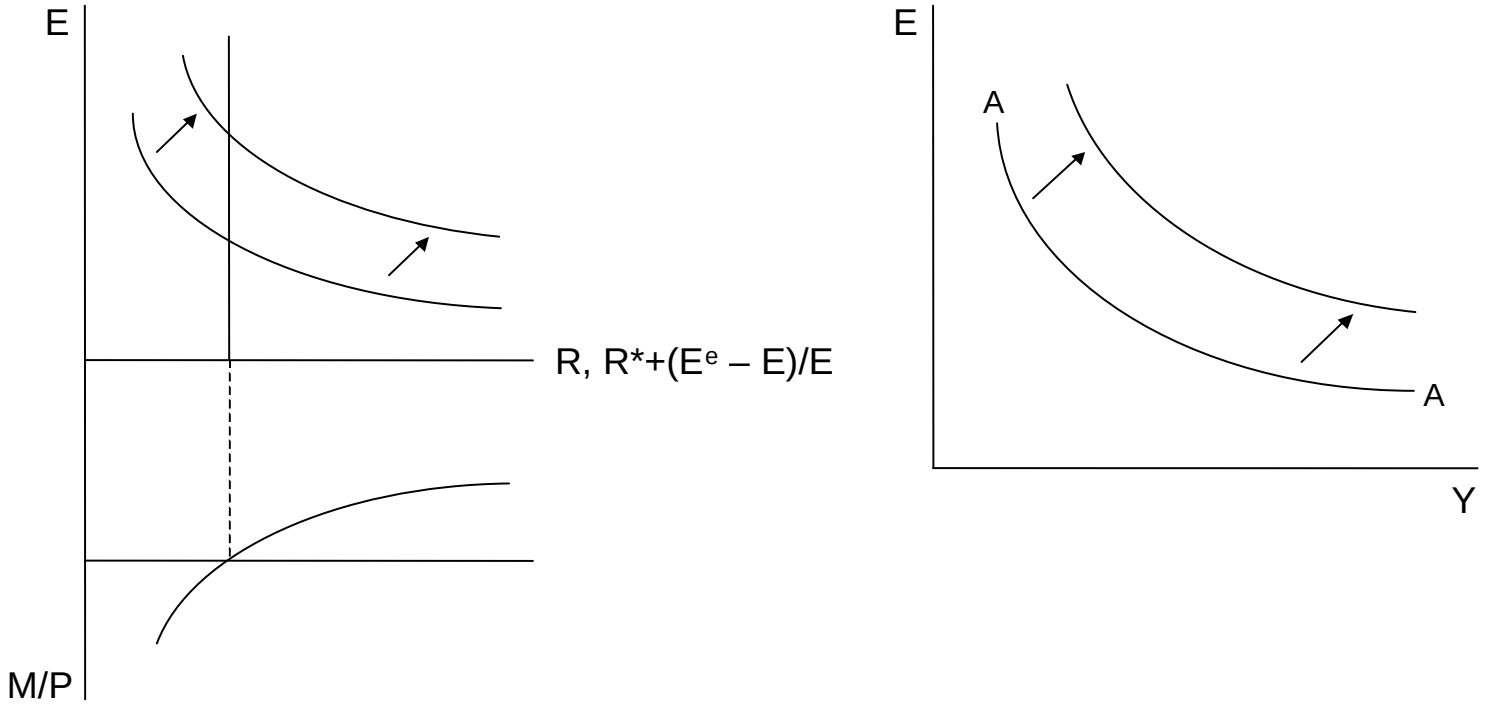
Factors shifting the AA-curve upwards

1. **An increase in money supply ($M^s\uparrow$)**
2. **A reduction in the price level ($P\downarrow$)**
3. **An expected future depreciation ($E^e\uparrow$)**
4. **A higher foreign interest rate ($R^*\downarrow$)**
5. **A reduction in domestic money demand**

AN INCREASE IN MONEY SUPPLY, A REDUCTION OF THE PRICE LEVEL



AN EXPECTED DEPRECIATION, AN INCREASE IN THE FOREIGN INTEREST RATE

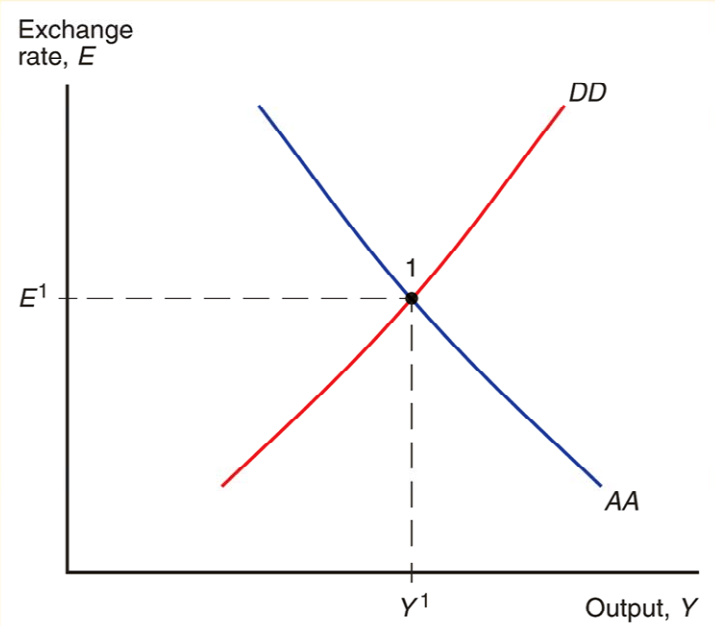


Putting the Pieces Together: the *DD* and *AA* Curves (cont.)

Figure 16-8

Short-Run Equilibrium: The Intersection of *DD* and *AA*

The short-run equilibrium of the economy occurs at point 1, where the output market (whose equilibrium points are summarized by the *DD* curve) and asset market (whose equilibrium points are summarized by the *AA* curve) simultaneously clear.

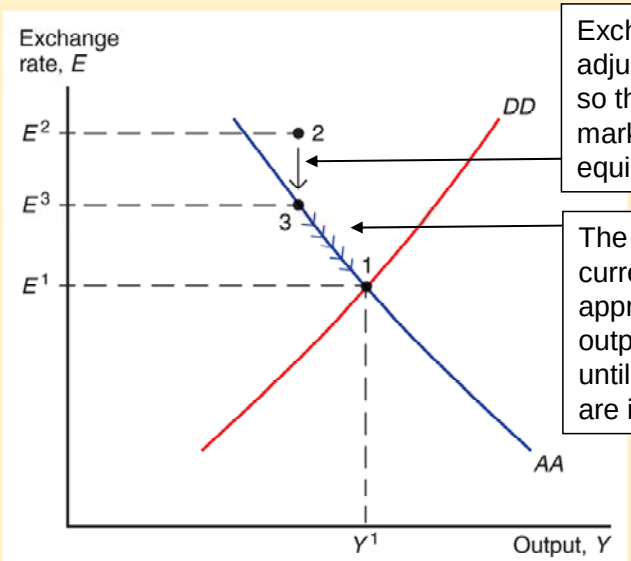


How the Economy Reaches Equilibrium in the Short Run

Figure 16-9

How the Economy Reaches Its Short-Run Equilibrium

Because asset markets adjust very quickly, the exchange rate jumps immediately from point 2 to point 3 on AA^1. The economy then moves to point 1 along AA^1 as output rises to meet aggregate demand.



Exchange rates adjust immediately so that asset markets are in equilibrium.

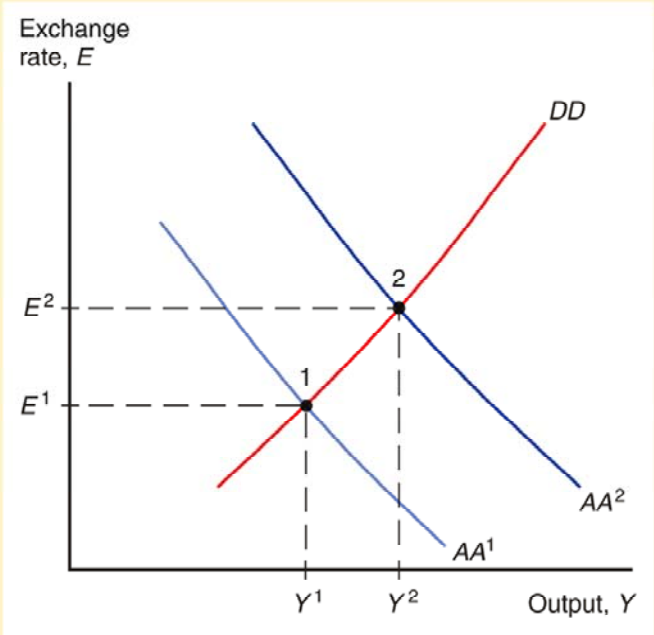
The domestic currency appreciates and output increases until output markets are in equilibrium.

Temporary Changes in Monetary Policy (cont.)

Figure 16-10

Effects of a Temporary Increase in the Money Supply

By shifting AA^1 upward, a temporary increase in the money supply causes a currency depreciation and a rise in output.

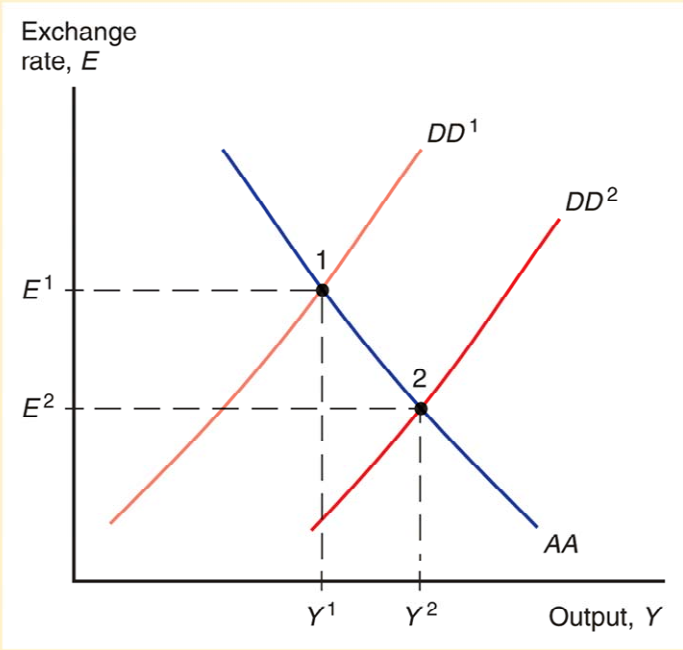


Temporary Changes in Fiscal Policy (cont.)

Figure 16-11

Effects of a Temporary Fiscal Expansion

By shifting DD^1 to the right, a temporary fiscal expansion causes a currency appreciation and a rise in output.

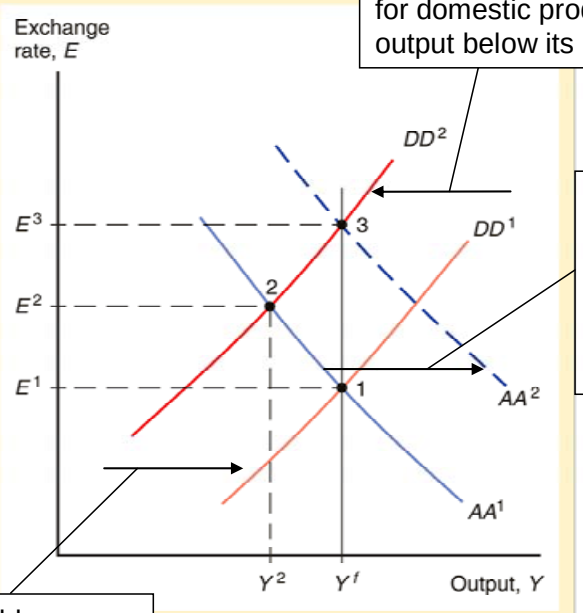


Policies to Maintain Full Employment (cont.)

Figure 16-12

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

A temporary fall in world demand shifts DD^1 to DD^2, reducing output from Y^f to Y^2 and causing the currency to depreciate from E^1 to E^2 (point 2). Temporary fiscal expansion can restore full employment (point 1) by shifting the DD schedule back to its original position. Temporary monetary expansion can restore full employment (point 3) by shifting AA^1 to AA^2. The two policies differ in their exchange rate effects: The fiscal policy restores the currency to its previous value (E^1); the monetary policy causes the currency to depreciate further to E^3.



Temporary fall in world demand for domestic products reduces output below its normal level

Temporary monetary expansion could depreciate the domestic currency

Temporary fiscal policy could reverse the fall in aggregate demand and output

Problems with stabilisation policy

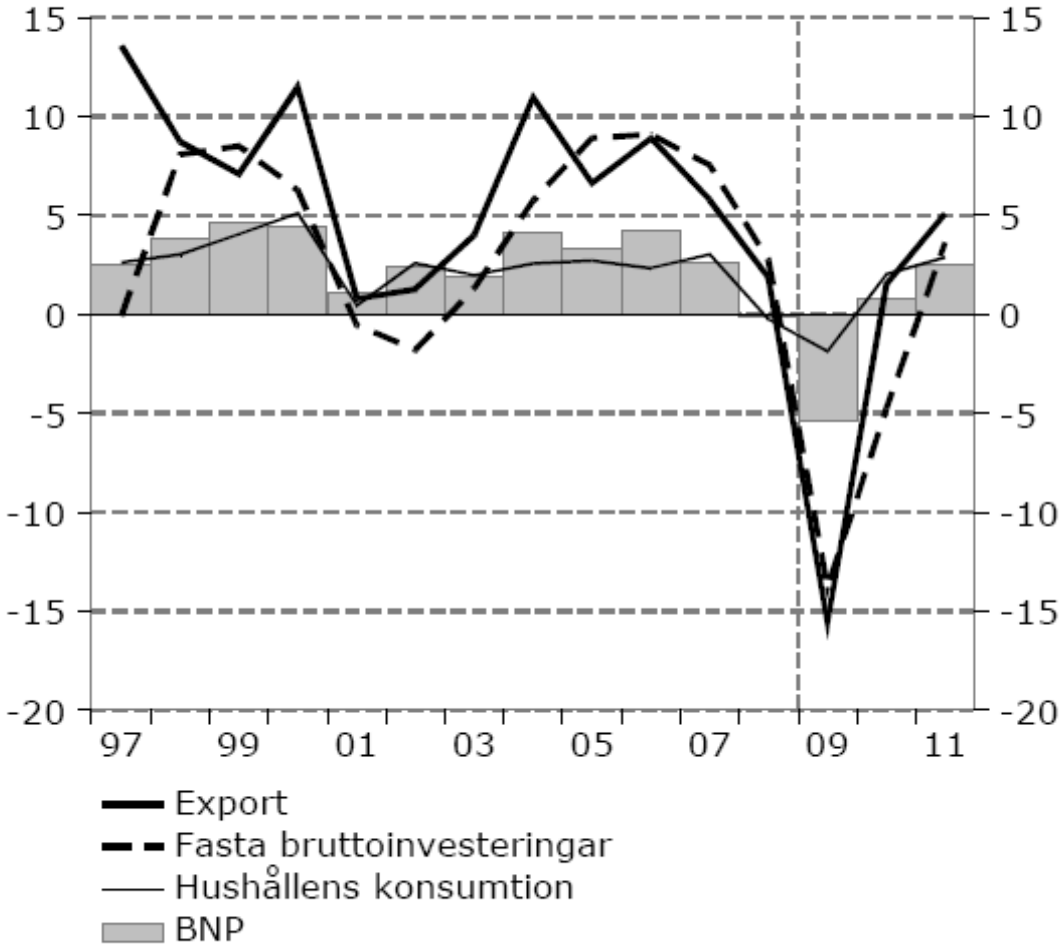
- **Policies can easily become too expansionary on average (”inflation bias”)**
- **It is difficult *ex ante* to identify disturbances and how strong they are**
- **An expansionary fiscal policy can cause permanent budget deficits**
- **Policy lags**
  - **Inside lag: the time it takes to recognise a shock (recognition lag) + the time it takes to decide what to do about it (decision or implementation lag)**
  - **Outside lag: the time it takes for the implemented policy to take effect**
  - **Fiscal policy: long inside lag, short outside lag**
  - **Monetary policy: shot inside lag, long outside lag**

Current Swedish debate

- **Both monetary and fiscal expansion**
- **Many economists have argued in favour of stronger fiscal stimulus (Fiscal Policy Council for example)**
- **The government has been reluctant**
  - **fear of future deficits and indebtedness**
  - **fear of too strong effects**
  - **fear that no ammunition left if the recession becomes very long**
  - **now sudden change in fiscal policy ambitions**

Diagram 7 BNP och efterfrågan

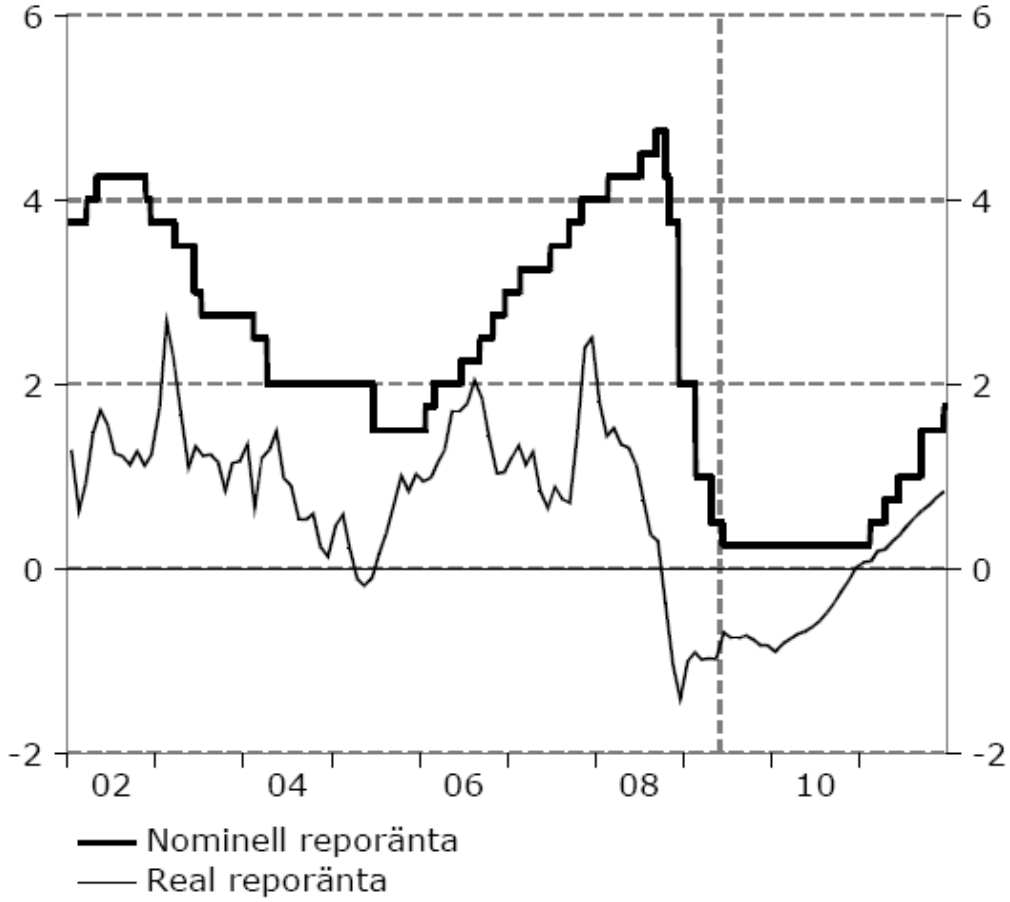
Årlig procentuell förändring



Källor: SCB och Konjunkturinstitutet.

Diagram 8 Nominell och real reporänta

Procent, dagsvärden respektive månadsvärden

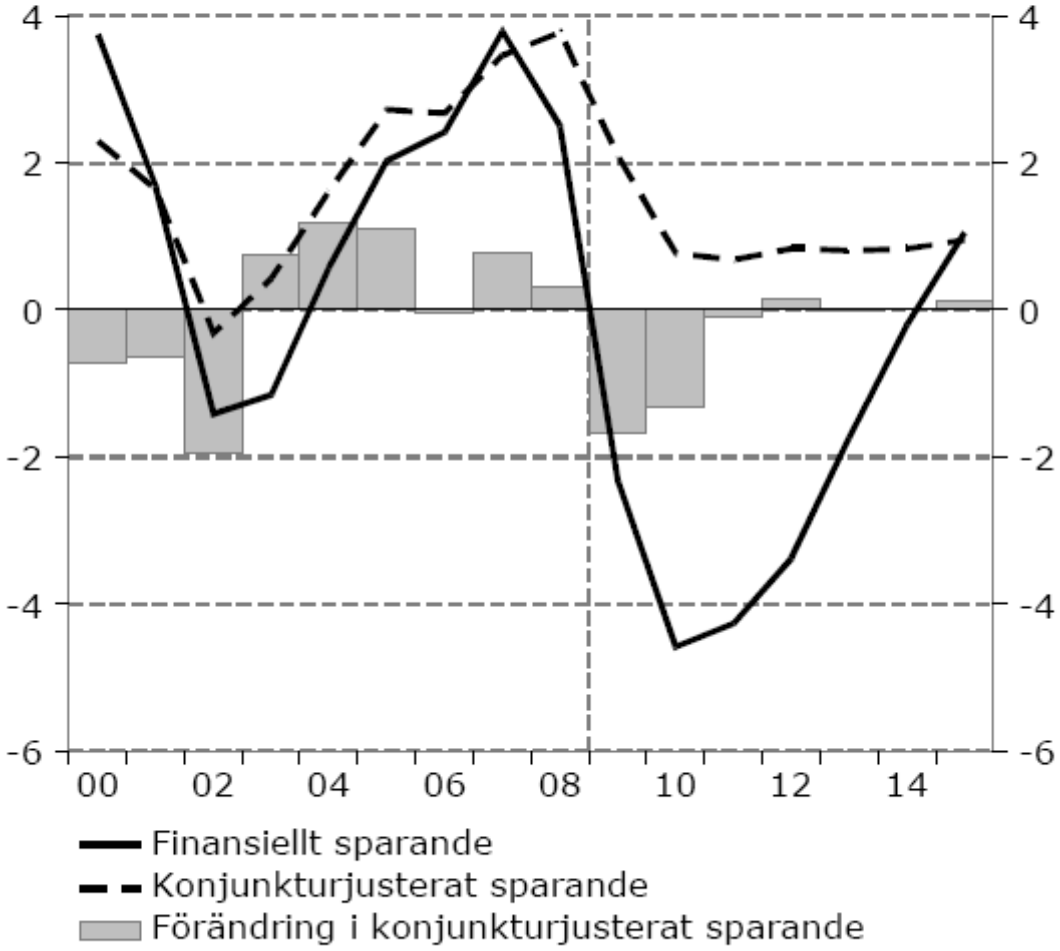


Anm. Real reporänta är beräknad som medelvärde av Konjunkturinstitutets reporänteprognos minus inflationsprognosen för motsvarande period.

Källor: Riksbanken, SCB och Konjunkturinstitutet.

Diagram 13 Finansiellt sparande, konjunkturjusterat sparande och förändring i konjunkturjusterat sparande

Procent av BNP respektive potentiell BNP



Källa: Konjunkturinstitutet.

Tabell 7 Försörjningsbalans

Miljarder kronor, löpande priser respektive procentuell förändring, fasta priser

	2008	2008	2009	2010	2011
BNP[1]	3 157	–0,2	–5,4	0,8	2,5
BNP, kalenderkorrigerad		–0,4	–5,3	0,5	2,5
Real BNI per capita		–1,0	–7,5	–0,5	2,1
Hushållens konsumtionsutgifter	1 467	–0,2	–1,9	2,0	2,9
Offentliga konsumtionsutgifter	834	1,5	0,9	1,1	0,4
Fasta bruttoinvesteringar	615	2,7	–13,8	–4,8	3,6
Lagerinvesteringar[2]	5	–0,6	–0,8	0,2	0,3
Export	1 711	1,9	–15,6	1,5	5,1
Import	1 477	3,0	–15,3	1,4	5,6
Total inhemsk efterfrågan	2 922	0,2	–4,5	0,7	2,6
Nettoexport[2]	235	–0,4	–1,3	0,1	0,1
Bytesbalans[3]	262	8,3	5,8	5,1	5,2

[1] Faktisk (ej kalenderkorrigerad) BNP-tillväxt baserad på prognos av det preliminära utfallet för offentlig konsumtion uppgår till –5,4 procent, 0,6 procent respektive 2,4 procent 2009, 2010 och 2011. Det nya sättet att mäta volymutvecklingen i offentlig produktion av individuella tjänster innebär att det uppstår en metodberoende skillnad mellan det preliminära och det definitiva utfallet för offentlig konsumtion (se faktarutan ”Prognoser på offentlig konsumtion”). Därmed skiljer sig även det preliminära och det definitiva utfallet för BNP. Konjunkturinstitutets prognoser för offentlig konsumtion avser det definitiva utfallet. Vid prognosutvärderingar kommer Konjunkturinstitutet emellertid att utgå ifrån en uppskattning av det preliminära utfallet för offentlig konsumtion.

[2] Bidrag till BNP-tillväxten.

[3] I procent av BNP, löpande priser.

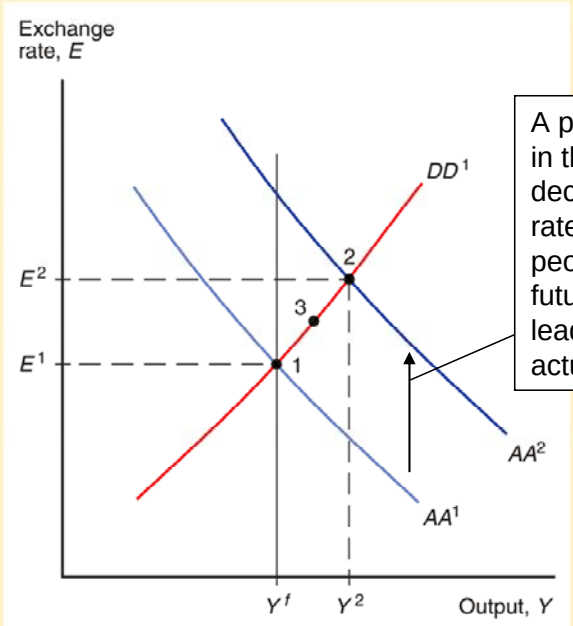
Källor: SCB och Konjunkturinstitutet.

Effects of Permanent Changes in Monetary Policy in the Short Run

Figure 16-14

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

A permanent increase in the money supply, which shifts AA^1 to AA^2 and moves the economy from point 1 to point 2, has stronger effects on the exchange rate and output than an equal temporary increase, which moves the economy only to point 3.



A permanent increase in the money supply decreases interest rates and causes people to expect a future depreciation, leading to a large actual depreciation

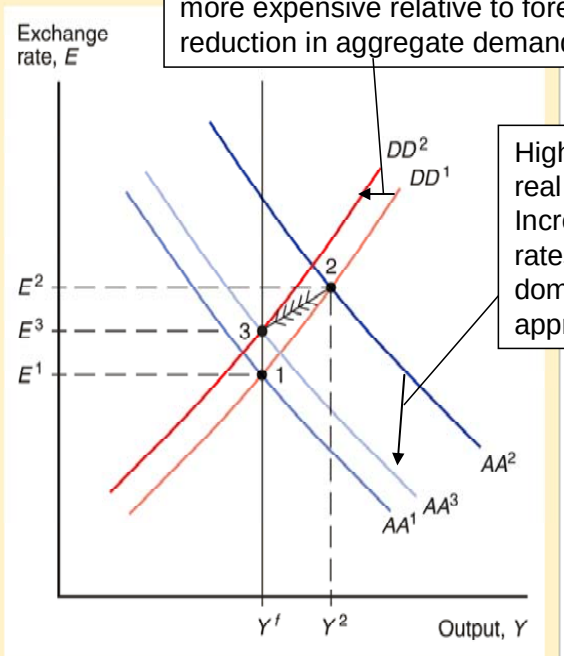
Effects of Permanent Changes in Monetary Policy in the Long Run (cont.)

Figure 16-15

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

After a permanent money supply increase, a steadily increasing price level shifts the *DD* and *AA* schedules to the left until a new long-run equilibrium (point 3) is reached.

In the long run, output returns to its normal level, and we also see overshooting: $E_1 < E_3 < E_2$



Higher prices make domestic products more expensive relative to foreign goods: reduction in aggregate demand

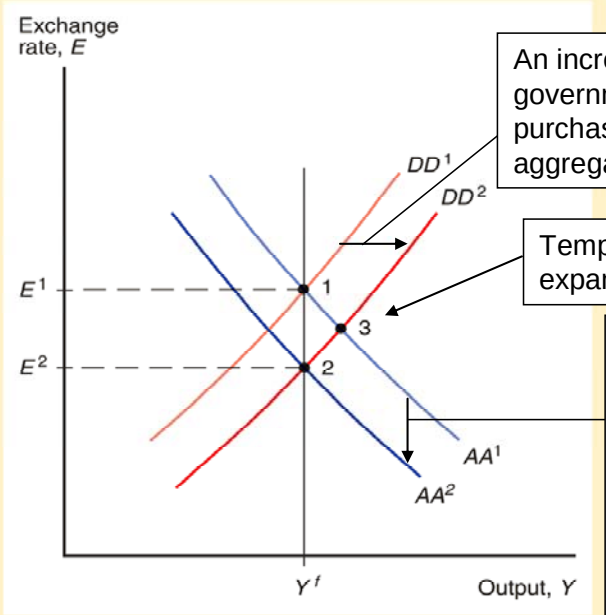
Higher prices reduce real money supply, Increasing interest rates, leading to a domestic currency appreciation

Effects of Permanent Changes in Fiscal Policy (cont.)

Figure 16-16

Effects of a Permanent Fiscal Expansion

Because a permanent fiscal expansion changes exchange rate expectations, it shifts AA^1 leftward as it shifts DD^1 to the right. The effect on output (point 2) is nil if the economy starts in long-run equilibrium. A comparable *temporary* fiscal expansion, in contrast, would leave the economy at point 3.



An increase in government purchases raises aggregate demand

Temporary fiscal expansion outcome

When the increase of government purchases is permanent, the domestic currency is expected to appreciate, and does appreciate.

Why has a permanent fiscal policy no output effects?

1. **In the long run we have $Y = Y_f$ och $R = R^*$ (output and interest rate at their equilibrium levels). Because $P = M^s/L(Y_f, R^*,)$ P must be unchanged in the long run.**

2. **In the short run M^s/P is given. Assume that $Y\uparrow$. Then $R\uparrow$. From interest rate parity we then have $(E^e - E)\uparrow$. A nominal exchange rate depreciation is expected.**

3. **But an expected nominal depreciation must also imply an expected real depreciation as P is given in the long run. This cannot be true because Y must then increase even more in the long run than in the short run and can then never return to its equilibrium level Y_f.**

4. **But everything will fit together if Y never changes, so that $Y = Y_f$ even in the short run.**

The mathematics of a permanent fiscal expansion

$$\frac{M^s}{P} = L(Y, R) \qquad (1)$$

$$R = R^* + (E^e - E)/E \qquad (2)$$

$$Y = D(EP^*/P, Y\text{-}T, I, G, Y^*) \qquad (3)$$

If $\uparrow \Rightarrow E = E^e \downarrow$ so that Y remains constant according to equation (3), equations (1) and (2) are also fulfilled.