

## 6.1 *The open economy, the multiplier, and the IS curve*

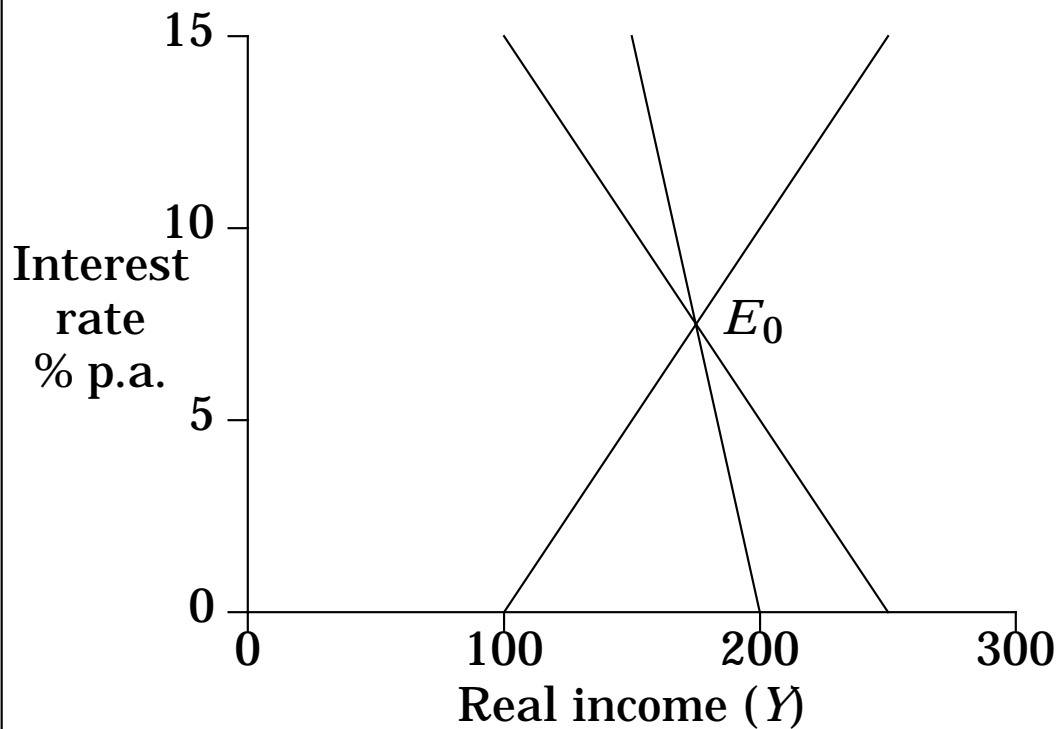
Assume that the economy is either closed (no foreign trade) or open. Assume that the exchange rates are either fixed or flexible. Assume too that the LM curve is unaffected by the openness of the economy and by the exchange rate regime. Focus on the effects on the IS curve, the slope of which depends on the multiplier ( $k$ , the inverse of the marginal leakage rate) and on  $b$ , the interest rate responsiveness of planned autonomous spending ( $A_p$ ).

*6.1.1 Open economy, fixed exchange rate:* In an open economy there is an additional possible leakage — induced imports ( $-n_0 Y$ ) — so its marginal leakage rate must be higher and its  $k$  lower than in a closed economy, as shown in the figure. This will result in a steeper IS curve than in a closed economy. This in turn means that the crowding-out effect (which reduces private spending in response to higher interest rates) is smaller and the fiscal policy multiplier ( $k_1$ ) is higher than in a closed economy.

Algebraically, the marginal leakage rate with:

- a dependence of net exports on income, through induced net exports ( $-n_0 Y$ )
- an income tax ( $t_0 Y$ )

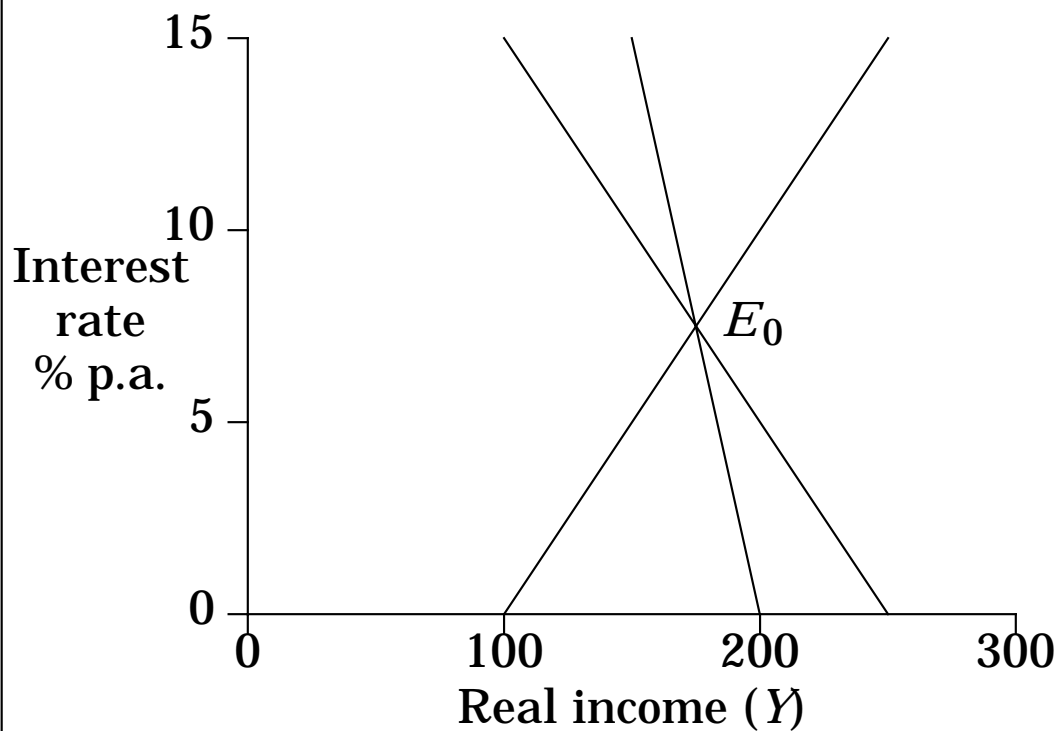
is given by  $s(1 - t_0) + t_0 + n_0$ , which results in a multiplier of



$$k = \frac{1}{s(1 - t_0) + t_0 + n_0}$$

Taking the values of the marginal propensity to save ( $s$ ), the income tax rate ( $t_0$ ), and the marginal propensity to import ( $n_0$ ) of 0.25, 0.2, and 0.1, respectively, we obtain a value of the multiplier ( $k$ ) of 2.0, and so of the fiscal and monetary multipliers  $k_1 = 1.333$  and  $k_2 = 0.667$ , respectively.

*6.1.2 Open economy, flexible exchange rate:* The opposite, however, occurs when the exchange rate regime changes from fixed to flexible. The next figure is drawn with two IS curves: one (the steeper) from fixed exchange rates, and the other (the flatter) from flexible exchange rates. Assume an increase in the interest rate. With a fixed exchange rate, crowding out is restricted to the effect on private autonomous spending ( $a + I_p$ ), which falls, and the effect of which is multiplied on



real income ( $Y$ ).

But with flexible exchange rates, higher interest rates result in an appreciation of the exchange rate ( $e$ ), and so a fall in net exports: seen as the IS curve rotates anti-clockwise as net exports ( $NX$ ) fall.

In short, a fiscal policy stimulus in an open economy with flexible exchange rates creates both a domestic and an international crowding-out effect

We cannot say whether the crowding-out effect in the open economy with flexible exchange rates is greater or less than in the closed economy, but this is hypothetical, as increasing openness, together with flexible exchange rates, has led to a flatter IS curve, a reduced fiscal policy multiplier, and an increase in the importance of crowding out.

6.1.3 Algebraically: Net exports are given by:

$$NX = NX_0 - n_0 Y - ue$$

where the  $(-ue)$  reflects the dependence of net exports on the real exchange rate. But (at least in the short run, in a simplified model which ignores longer-term changes in the “fundamentals”) the real exchange rate is positively related to the interest rate:

$$e = dr,$$

where  $d$  is the response of the real exchange rate to change in the interest rate (Gordon uses 25, but the number is tied to the exchange rate index, so cannot be unthinkingly borrowed).

Net exports are now given by:

$$NX = NX_0 - n_0 Y - udr$$

which changes the equation for commodity market equilibrium, since  $NX$  is a component of total expenditure:

$$Y = k(A_0 - [b + ud]r) = k(A_0 - b'r)$$

The new variable  $b'$  is the response of real autonomous planned expenditure ( $A_p$ ) to a 1 percentage point change in the interest rate ( $r$ ), taking into account the indirect effect of the interest rate on the exchange rate ( $e$ ).

Remember that planned autonomous spending is given by

$$A_p = A_0 - b'r,$$

where  $A_0$ , the total amount of autonomous

spending that occurs at zero interest rate, is given by

$$A_0 = a + I_p + NX_0 + G - cT_0$$

So the effect of the interest rate on net exports and on the effects of fiscal and monetary policy measures with a flexible exchange rate can be simply incorporated into the IS-LM model by replacing  $b$  with  $b'$ .

The fiscal policy multiplier ( $k_1$ ) becomes 1.0 and the monetary policy multiplier ( $k_2$ ) 1.0. (The marginal leakage rate is  $1/2$ .)

$$Y = k_1 A_0 + k_2 (M^s / P)$$

Using these multipliers, a real income level of \$175 billion p.a. could be obtained with  $A_0 = \$125$  billion p.a. and  $M^s / P = \$50$  billion.

Note that because the autonomous spending multiplier ( $k_1$ ) is now 1 instead of 2, it takes \$125 billion p.a. instead of \$62.5 billion to reach a real income of \$175 billion p.a. The extra autonomous spending comes from government spending ( $G$ ), financed by the income tax revenues.

## 7. Exchange Rates and Policy: The Twin Deficits

Consider the basic definition:

$$T - G \equiv I - S + NX$$

If investment ( $I$ ) and saving ( $S$ ) are roughly equal, this tells us that the domestic budget deficit ( $T - G$ , negative) must roughly equal the trade deficit ( $NX$ , negative). If saving increases, then for a given domestic budget deficit the trade deficit must fall, or for a given trade deficit the budget deficit must grow.

Until the cyclical reversal on the budget because of the recession, Australia had been enjoying a budget surplus ( $T - G$  positive), which implies higher investment levels ( $I$ ), lower saving ( $S$ ), and/or lower trade deficit ( $-NX$ ).

What if value of the Aussie dollar to achieve balanced trade is far below its current level? (And the value to achieve a current account surplus is lower still, given the negative capital account because of interest payments.) What response of fiscal and monetary policy is appropriate?

Three broad possibilities:

- do nothing: allow  $T - G$  and  $NX$  to remain negative, with a growing foreign debt. (Some economists have argued that to the extent that the negative capital account is due to *private* borrowers in Australia borrowing from *private* lenders abroad, the growing debt is of no concern to the government or to others — in effect, foreigners are lending to Australia to

finance our negative net exports.)

- allow the Aussie dollar to fall, hopefully improving  $NX$  up to zero, as imports fall and exports rise. But the definition above shows that unless the budget deficit were eliminated, then  $I - S$  would have to become negative, requiring sufficiently high interest rates to dampen domestic investment on the assumption that a revival in saving ( $S$ ) didn't occur. (Will the new superannuation laws result in a higher  $S$ , or will household expenditures rise to compensate for the compulsory saving of the higher super rates? Stay tuned.)
- reduce both deficits towards zero, which would allow  $S - I$  to remain roughly balanced and prevent a possible collapse in investment ( $I$ ). In terms of the IS-LM model, the solution creates a shift towards fiscal tightness and monetary ease, which would allow real interest rates to decline, as from point  $E_5$  to  $E_1$ .

Although the cyclical increase in the budget deficit (due to lower tax revenues and higher transfer payments during the recession) has been accompanied by lower nominal interest rates, inflation has also fallen. The nominal exchange rate has fallen with the nominal interest rates. Investment has fallen with the recession, but the trade deficit has not fallen as expected.

## Aggregate Demand and Supply

*At last we relax the assumption of fixed prices.* We develop the aggregate demand and supply curves by extending the IS-LM model and endogenise prices in the economy. The *aggregate demand curve* (different combinations of the price level and real output at which the money and commodity markets are both in equilibrium) is first derived by analysing how varying the price level affects equilibrium output in the IS-LM model. Then an explicit analysis of the labour market — showing how profit-maximising firms determine their level of employment — is applied in the derivation of the *aggregate supply curve* (the amount of output that firms are willing to produce at different price levels). Finally, these two concepts are combined to examine the short- and long-run effects of a fiscal and monetary expansion on the equilibrium level of prices, output, and wage rate. This extension of the IS-LM model allows us to consider explicit supply-side shocks, such as crop failures and the oil-price shocks of the 1970s.



## 1. Flexible Prices and the AD Curve

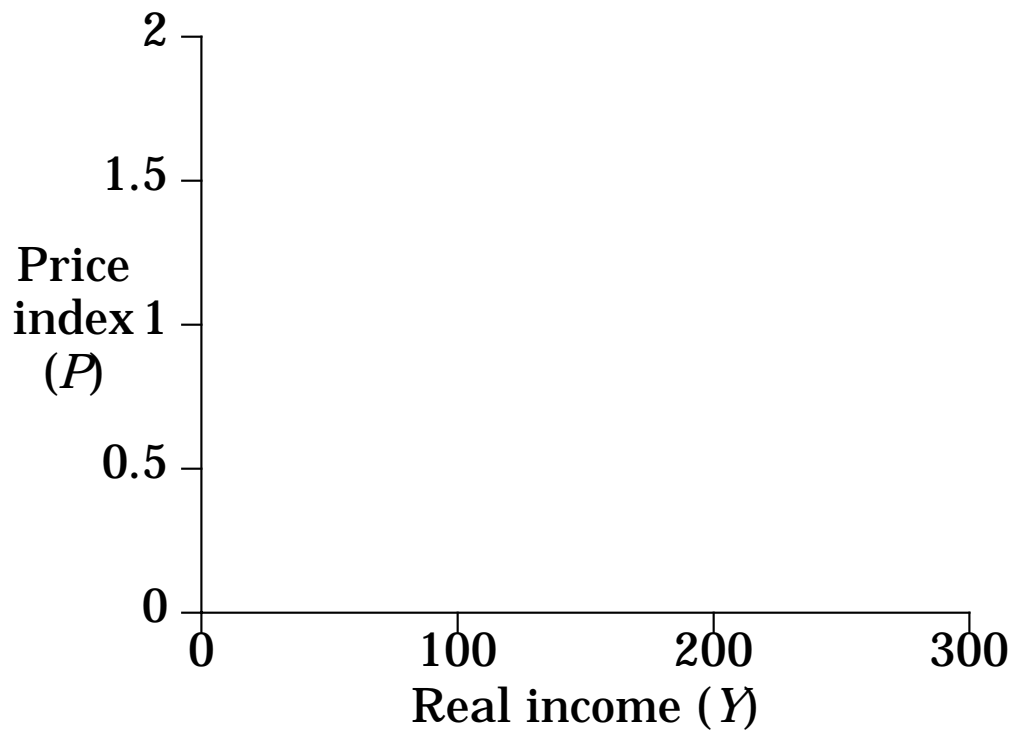
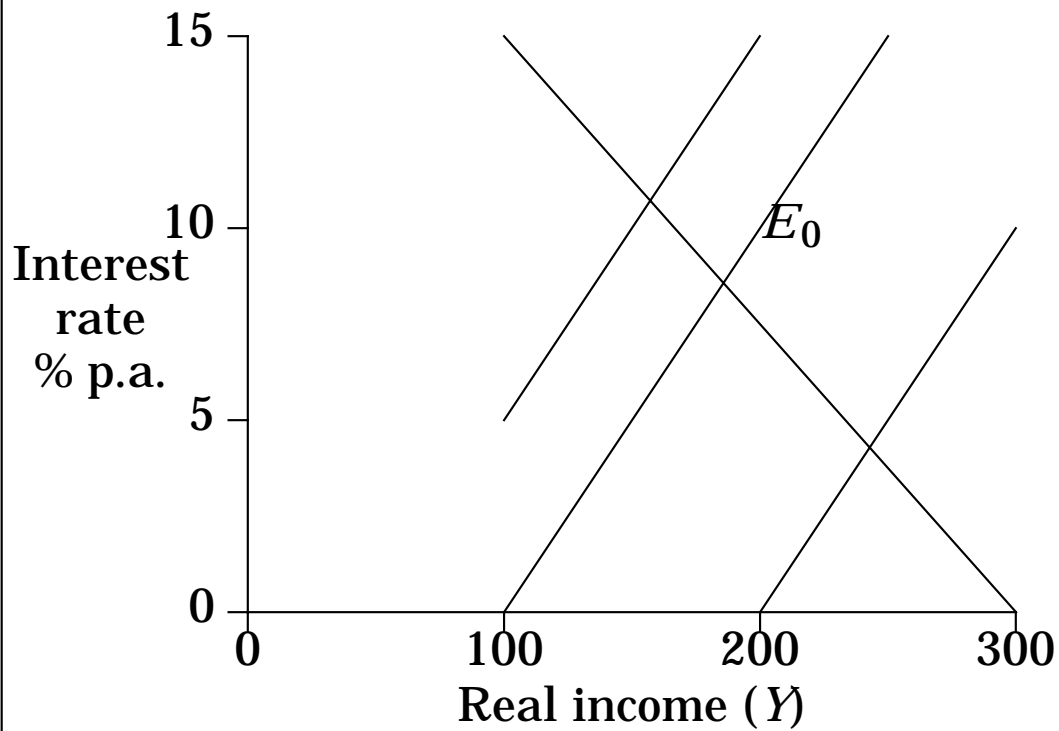
The IS-LM framework extended the simple income determination model of the Keynesian cross by endogenising interest rates. The demand and supply framework will extend the IS-LM model by adding the price level to the set of endogenous variables in the economy.

Remember, heretofore we have been considering *real* variables, including the real money supply ( $M^s/P$ ). Shifts in the LM curve result from changes either in the nominal money supply ( $M^s$ ) as previously or in the price level ( $P$ ): a doubling in the price level results (cet. par.) in a halving of the real money supply. In order for the demand for money to fall too, some combination of lower real income and higher interest rate is needed, which means that the LM curve shifts to the left as prices rise. The equilibrium point in both markets (the intersection of the shifting LM curve and the unchanging IS curve) corresponds to a changing combination of real income ( $Y$ ) and price index ( $P$ ) as shown in lower figure: *the AD curve*.

The AD curve slopes downwards because a lower price index ( $P$ ) raises the real money supply, thereby lowering the interest rate ( $r$ ) and stimulating planned expenditures ( $A_p$ ), requiring an increase in actual real GDP ( $Y$ ) to keep the commodity market in equilibrium.

The equation of the AD curve is:

$$Y = k_1 A_0 + k_2 \frac{M^s}{P}$$



Its position depends on all the factors that can shift the LM or IS curves, including  $A_0$  and  $M^S$ : an increase in either will shift AD to the right, and vice versa.

Note that AD is not the behavioral relationship between price and quantity of the individual consumer seen in microeconomics, but the combination of price index ( $P$ ) and real income ( $Y$ ) at which both the market for output (along the IS curve) and the market for money (along the LM curve) are in market-clearing equilibrium.