IV. The Mundell-Fleming Results

The M-F Result under Flexible Exchange Rates

Professor Dornbusch discusses the M-F Result under flexible exchange rates in the first part of Chapter 11 of Dornbusch (1980). The model used in this chapter is different from the one used in Chapter 10, it is log-linear. Log-linear models are convenient because the equations are linear to begin with, we do not have to take differentiations in comparative statics. In the case of log-linear models of the type used by Canzoneri and Henderson (discussed in Section IV), there is the added advantage that variables take the value zero at equilibrium, as they are defined as divergences from equilibrium values.

Economists have differing opinions on whether we should indicate clearly the linear approximation process in which the linear model is derived from the original, non-linear model. Professor Dornbusch, for instance, does not discuss this process in the Chapter. For the LM equation, taking logs of both sides of the equation is often the right procedure. One caveat is that the rate of interest r should be replaced by $(1+r)$ in the original version before taking logs. This does not violate economic logic, and allows r to remain a variable between zero and one in the linearised version. A bigger problem is with the IS equation, because the IS equation is an accounting identity that must be expressed in terms of additions and subtractions. It states that aggregate production is equal to consumption plus investment plus government spending plus exports minus imports. As we all know, log(A+B+C-D) is not equal to logA+logB+logC-logD. Rather, log(ABC/D) = logA+logB+logC-logD. So taking the log of both sides of the IS equation, which is linear to begin with, will not give us a proper IS equation in the linearised model. At the same time, we cannot start by specifying the IS equation in multiplications and divisions, because aggregate supply is not equal to consumption times investment times government spending times exports divided by imports. Canzoneri and Henderson (1988, footnote 9) show the IS equation in their original forms, from which their linear IS equations are derived.

Professor Dornbusch uses the IS-LM diagram to show the M-F result for a small country under flexible exchange rates, perfect capital substitutability and static expectations. Monetary policy is effective because it causes the exchange rate to depreciate and improves the CA. In the diagram, this is shown by the shift of the IS upward and to the right, after LM has shifted downward to the right. Both curves meet again at the original level of r. The exchange rate depreciates because the excess supply of money puts downward pressure on r, causing capital outflow (selling of the domestic currency). The outflow of capital continues until r is back up to the level equal to r^*. Fiscal policy is not effective because the capital inflow induced by the upward pressure on r causes e to appreciate, reducing exports. In the IS-LM diagram, the IS shifts to the right but then back left to its original position.

Alternative assumption: Two-Country Assumption

The model used in this part of Chapter 11 is the one we used earlier to derive the reduced form for the exchange rate. There are two sets of IS-LMs, and one IRPC under static expectations.

(1) $y = g + \delta(e + p^* - p) - \sigma r + f y^*$

(2) $h - p = -\lambda r + \varphi y$

(3) $y^* = g^* - \delta^*(e + p^* - p) - \sigma^* r^* + f^* y$

(4) $h^* - p^* = -\lambda^* r^* + \varphi^* y^*$

(5) $r = r^*$

Endogenous variables are y, r, y^*, r^* and e, exogenous variables are g, g^*, h, h^*, p and p^*. r is equal to r^* and is endogenous. As in the case under fixed exchange rates, it is this endogeneity of r that recovers policy effectiveness. Fiscal policy becomes effective in the two-country model. Professor Dornbusch shows this by drawing curves in a ($e - p, r$) plane. We will use Cramer's rule instead. This makes it easier to interpret the results using partial derivatives.

We will substitute y and y^* out of the equations, derive dr/dh, dr/dg, $d(e-p)/dh$, $d(e-p)/dg$, then use the relationship between y and r as well as y^* and r^* to derive dy/dh, dy^*/dh, dy/dg and dy^*/dg.

First we substitute y^* from the foreign IS equation into the domestic IS equation. This gives us

$$y = \alpha(e + p^* - p) - \beta r + kg + kfg^*$$

Similarly, by substituting y from the domestic IS equation into the foreign IS equation, we have

$$y^* = -\alpha^*(e + p^* - p) - \beta^* r + kg^* + k\ f^* g$$

where

$$\alpha = \frac{\delta - f\delta^*}{1 - ff^*}, \quad \beta = \frac{\sigma + f\sigma^*}{1 - ff^*}, \quad k = \frac{1}{1 - ff^*},$$

$$\alpha^* = \frac{\delta^* - f^*\delta}{1 - ff^*}, \quad \beta^* = \frac{\sigma^* + f^*\sigma}{1 - ff^*}$$

and $\alpha, \beta, \alpha^*, \beta^*, k$ are positive.

Next we solve the LM equations for y and y^*.

$y = [h - p + \lambda r]/\varphi$

$y^* = [h^* - p^* + \lambda^* r]/\varphi^*$

Eliminate y and y^* from the pairs of equations and we have two equations with two endogenous variables; r and e. In matrix form, this will be

$$\begin{pmatrix} \alpha & -\dfrac{\lambda + \beta\varphi}{\varphi} \\ -\alpha^* & -\dfrac{\lambda^* + \beta^*\varphi^*}{\varphi^*} \end{pmatrix} \begin{pmatrix} de \\ dr \end{pmatrix} = \begin{pmatrix} -k \\ -k\ f^* \end{pmatrix} dg + \begin{pmatrix} 1/\varphi \\ 0 \end{pmatrix} dh$$

where we have used $dp = dp^* = dh^* = dg^* = 0$.

The determinant of the coefficient matrix $|D|$ is negative and we can use Cramer's Rule.

The result is as follows:

$de/dh = -(\lambda^* + \beta^*\varphi^*)/|D|\varphi\varphi^* > 0$

$dr/dh = \alpha^*/|D|\varphi < 0$

$dy/dh = [-\alpha(\lambda^* + \beta^*\varphi^*)/\varphi\varphi^* - \beta\alpha^*/\varphi]/|D| > 0$

$dy^*/dh = \alpha^*\lambda^*/|D|\varphi\varphi^* < 0$

$de/dg = k(\lambda^*\varphi + \beta^*\varphi\varphi^* - f^*\lambda\varphi^* - f^*\beta\varphi\varphi^*)/|D|\varphi\varphi^*$

$dr/dg = -k(\alpha f^* + \alpha^*)/|D| > 0$

$dy/dg = -k\lambda(\alpha f^* + \alpha^*)/|D|\varphi = (\lambda/\varphi)dr/dg > 0$

$dy^*/dg = -k\lambda^*(\alpha f^* + \alpha^*)/|D|\varphi^* = (\lambda^*/\varphi^*)dr/dg > 0$

The most interesting of these results is of course that fiscal policy is effective. It is effective in increasing both y and y^*, and only because dr/dg is positive instead of zero.