IV. The Mundell-Fleming Results

The Mundell-Fleming results and the Mundell-Fleming model

"The Mundell-Fleming results" is the name that was given the combined results of two separate papers written by Robert Mundell and Marcus Fleming in the early 1960s. The results concern the implications of increased capital flows to effectiveness of monetary and fiscal policy, under fixed and flexible exchange rates. "Effectiveness of policy" here means the ability of policy to influence income.

Often, we also come across the expression "Mundell-Fleming model". This is a broader concept, as not all Mundell-Fleming models lead to the Mundell-Fleming results. M-F models are basically open-economy versions of the IS-LM models, and vary widely in their complexity (number of equations, number of endogenous variables, how many endogenous variables are determined simultaneously).

In this section we will first use a simple M-F model to show how the M-F results come about. Normally, to get a result from a model, we need to solve the model for equilibrium and conduct Comparative Statics. With the simple model we use here, however, this is not the case. We need only to understand which endogenous variable is determined by which equation to see that the M-F result holds. Note that this method does not always work. If the model comprises more equations that contain more than one endogenous variable and more endogenous variables are simultaneously determined, we would have to solve the model in order to derive the effects of policy on income. And in such a model, it is less likely that the M-F results hold.

Later in this section, we will follow the analysis laid out in Dornbusch (1980) to show examples of models in which the M-F results do not hold. There we will see that the key to the results is the fact that r is fixed.

A Simple Model

First, let us state the M-F results. Assuming the country is a small country, capital is perfectly substitutable and expectations regarding exchange rate depreciation are static, monetary policy is effective and fiscal policy is ineffective under floating exchange rates, while monetary policy is ineffective and fiscal policy is effective under fixed exchange rates.

We use the following small country model:

(1) $Y = C(Y) + I(r) + G + CA(e)$

(2) $M = L(r, Y)$

(3) $r = r^*$

(4) $M = D + eR$

where the equation (4) shows the balance sheet of the central bank. D is the stock of domestic bonds held by the central bank, and R is the stock of foreign reserves (bonds) held by the central bank. The domestic price level is assumed to be constant, and equal to 1 for simplicity, which is why it does not appear as the denominator on the left-hand side of the equation (2), the LM equation. Equation (3) is the IRPC with static expectations regarding exchange rate depreciation.

The endogenous and exogenous variables vary according to the exchange rate regime:

		floating	fixed
endogenous:	Y, r	e, D	R, M
exogenous:	G, r^*	M, R	D, e

The fact that M is endogenous under fixed exchange rates already tells us that monetary policy is ineffective under fixed exchange rates. M is not controllable, because it must change endogenously as a result of foreign exchange market intervention. When the central bank intervenes in the market to maintain e constant, M and R are exchanged and they both change endogenously. The same message was contained in the Inconsistent Triangle discussed earlier. Under floating exchange rates, M is controllable because there is no need to maintain a fixed e. M is exchanged with D as the need arises for open market operations to maintain stability in the domestic economy.

The M-F Results and the Structure of the Model

Now we will think about which endogenous variable is determined by which equation. Under both the floating and fixed exchange rate regimes, r is determined by equation (3). In equation (3), r is the only endogenous variable; it is the only variable that can adjust to the level that allows this equation to hold. Note that once an endogenous variable is determined by the need to maintain the equilibrium in one equation, it cannot change for other purposes. It must be treated as fixed in other equations. As we will see below, the importance of the fixed r cannot be overemphasised in the logic of M-F results.

The remaining endogenous variables are Y, e, D under floating and Y, R, M under fixed exchange rates.

Under floating exchange rates, once r is determined by equation (3), the only endogenous variable left free to adjust in equation (2) is Y. So Y is determined by equation (2). Once r and Y are thus determined, the only variable left free to adjust in equation (1) is e, and in equation (4) is D. So e is determined by equation (1) and D is determined by equation (4).

Under fixed exchange rates, once r is determined by equation (3), the only endogenous variable left free to adjust in equation (1) is Y. So Y is determined by equation (1). Once r and Y are thus determined, the only variable left free to adjust in equation (2) is M, and in equation (4) is R. So M is determined by equation (2) and R is determined by equation (4).

What are the implications of such a structure for policy effectiveness? Recall that in order for an exogenous variable to affect an endogenous variable, the latter has to be changeable. An endogenous variable is not changeable if it is already determined by another equation, to which the exogenous variable does not belong. This means that only exogenous variables that appear in the equation by which Y is determined can affect Y in this simple model. In the case of floating exchange rates, Y is determined by (2) and only M appears in (2), while in the case of fixed exchange rates, Y is determined by (1) and only G appears in (1). Hence, only monetary policy is effective under floating exchange rates while only fiscal policy is effective under fixed exchange rates, and we have the M-F results.

Interpreting the M-F results

The economic logic behind the M-F results is as follows.

Under flexible exchange rates, monetary policy is effective because excess supply of money must be met with increased demand for money if equilibrium in the money market is to be maintained, and that can only come about after an increase in Y, given that r cannot change. This new, higher level of Y means that both Y and $C(Y)$ in equation (1) are higher. But the increase in the left-hand side is more than the increase in the right-hand side of (1) because the marginal propensity to consume is between zero and one. So there is excess supply in the IS market, and in order to recover equilibrium, e depreciates to bring about an increase in exports. Another way to look at this e depreciation is to say that an increased M puts downward pressure on r, leading to an immediate and massive outflow of capital involving the purchase of the foreign currency in exchange for the domestic currency. This is the story consistent with the structure of this model, even though it might be more intuitive to think that Y is determined by the IS equation.

And fiscal policy is not effective under flexible exchange rates because Y has already adjusted to the level that maintains equilibrium in the money market, and stays there. In terms of the IS equation, the usual multiplier effect is exactly offset by the negative effects on Y of e appreciation resulting from the increase in G. An increase in G appreciates e because it puts upward pressure on r, causing massive capital inflow (a purchase of domestic currency in exchange for the foreign currency).

Under fixed exchange rates, monetary policy is ineffective because M is not controllable to begin with. As stated earlier, we already knew this from the Inconsistent Triangle. An open market operation (exchanging M with D) for the purpose of influencing Y will in general not be consistent with fixing e (exchanging M with R).
An increase in G has the usual multiplier effect, and since e is not allowed to appreciate, Y certainly increases under fixed exchange rates. An increase in G does put pressure on e to appreciate, but this is countered by intervention in the form of selling the domestic currency in return for the foreign currency. The resulting increases in M and R are consistent with the changes in M and R required for maintaining equations (2) and (4).

Effectiveness of Policy

In general, if all of the following three conditions hold, it is sufficient for policy to be effective:

1. the policy variable is controllable
2. the functional relationship between the policy variable and the objective is known
3. the functional relationship between the policy variable and the objective is stable

The three conditions are not necessary conditions because it is possible for the policy goal to be attained through the influence of some other event or by a fluke.
This is true not only with respect to macroeconomic policy. For example, you might be trying to get your friend to lend you some notes for classes you did not attend. You are thinking of asking him or her to lend you those notes, in return for a sandwich. For your plan to succeed, first of all you must have the wherewithal to buy the sandwich. Then you also need to be sure that your friend is the kind of person that will lend notes in return for a sandwich, and what kind of sandwich. Finally, all of this will come to naught if your friend suddenly changes his/her mind and decides against lending precious notebooks in return for a mere sandwich.
The first condition is not met by monetary policy under fixed exchange rates, in the M-F context. As we will confirm shortly, the M-F results are heavily dependent on the fact that the domestic interest rate r is fixed and does not respond to policy. In this model, this is due to the three assumptions of small country, perfect capital substitutability and static expectations, but there could be other reasons. In any event, when r is fixed and if Y will not increase unless r declines, the second condition is violated. It would be incorrect to presuppose a working functional relationship between monetary policy and Y.
And even if the first and second conditions are met, the goal of policy will not be attained if people changed their reactions before and after policy, a point we already emphasised in

relation to "Lucas' critique" and the importance of partial derivatives.

A Note regarding the Simultaneous determination of CA and $S-I$

Before we discuss the M-F results in further detail, it would be instructive to use our simple model to confirm the simultaneous determination of CA and $S-I$. In fact, this simple model is a special case in which CA and $S-I$ are NOT simultaneously determined. The structure of this model dictates that $S-I$ be determined first and CA follow. Under flexible exchange rates, after r is determined by the IRPC, Y is determined by the LM equation. This fixes $Y-C(Y)-I(r)-G$, because these terms depend only on r, Y and an exogenous variable G. But $Y-C(Y)-I(r)-G$ is $S-I$, the left-hand side of the IS equation re-written as $Y-C(Y)-I(r)-G=CA(e)$. So in this simple M-F model, $S-I$ is determined first via determination of r and Y, and e is determined at a level that allows $CA(e)$ to conform to the size determined by $S-I$. Along with the feature that Y is determined in the money market instead of the goods market, this is a rather peculiar feature of this simple M-F model that leads to M-F results.

In order to change the structure of the model into a more general one in which both sides of $CA=S-I$ are determined simultaneously, we need endogenous variables that are simultaneously determined to be on both sides of this equation. It could be two different endogenous variables that are determined simultaneously in the model, or it could be the same endogenous variable on both sides.

We can change the structure of the model in this way using some reasonable assumptions. For example, we could specify private savings $Y-C(Y)$ as functions of e, reflecting the fact that some savers held their savings in foreign currency denominated assets. Or we could model consumption as a function of real wealth W/P in addition to income Y, and real wealth could comprise domestic and foreign assets: $W \equiv M+B+eF$. In both of these cases, $Y-C(Y)$ will become a function of e and we will have e on both sides of the equation $CA=S-I$. If we kept the IRPC condition but discarded the static expectations assumption regarding exchange rate depreciations, then r will be equal to $r^*+\pi$ where π is a function of e. Again, both sides become a function of e. All of these specifications seem appropriate in fact, in a world in which capital flows across borders with such speed and volume that the IRPC holds.

Of course, making these changes may change the model in such a way that the M-F results can no longer be obtained. Looking at it this way, the M-F results seem to correspond to a rather particular world. As with many other results and conclusions, we need to keep in mind that they are only as relevant as the model used in deriving them. Nevertheless, the results are worth studying in detail. First, the result that monetary policy cannot be used

to stabilise both the domestic economy and the exchange rate at the same time is extremely important and pertinent. Second, it is also true that fiscal policy could affect the economy in unexpected ways if we fail to take into account its effect on the exchange rate. And third, studying the M-F results provides excellent training in macroeconomic models. That is what we will be doing for the rest of Section IV.