A Macromodel for a Small Open Economy —The Keynesian Approach Revisited

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1. Introduction

Most Keynesian open macromodels or the familiar IS-LM-FE models have recently been subject to severe attacks for their unduely stress on the short-run flow-or quasi-equilibrium situation. As critics point out correctly, if an eeonomy maintains payments balance with deficits on current account that are just matched by inflows of financial capital, some endogenous variables must change long before its short-term obligations toward the rest of the world reach infinity [see, for example, Grubel (1976)]. Despite this and other deficiencies, the IS-LM-FE models still provide a simple and theoretically rigrous framework on which payments adjustments and other related short-run issues are systematically analyzed.

This paper attempts to extend or adapt these models to a general context by including several important advancements recently made in macroeconomic theory. Specifically, among other things, the model used here will allow for the intrinsic dynamics of a small open economy stemming from the interactions between stock and flow variables. The dynamics considered contains: (i) accumulation of financial assets arising from financing government budget deficits, (ii) interaction of capital flows and balance of payments and the resulting accumulative impacts on domestic asset holdings, and (iii) evolutions over time

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of expectations of commodity prices and foreign exchange rates. Within such a context, this paper will primarily address to both short-run and long-run effects of monetary and fiscal policy, though it will touch upon in appropriate places dynamic evolution and stability conditions.

2. The Aggregate Demand Function

2.1 The IS, LM, and FE Curves

Consider a small open economy with the freely floating exchange rate. For simplicity's sake, assume that private citizens at home and abroad do not possess foreign currency, but they may hold foreign bond in their portfolios. Also assume that capital are perfectly mobile interrationally in the sense that the expected rates of return on domestic and foreign bonds in terms of domestic currency must always be equal. This of course implies that

$$(1)\quad 1+r=\frac{E^*}{E}(1+r^*)$$

where r and r^* denote domestic and foreign rates of interest, and E and E^* are spot and expected future spot rates of foreign exchange[1]. It should be noted that eq. (1) is conventionally written as $r=r^*$ and, since r^* is taken to be given exogenously, r is a constant[2] [Mundell (1968)]. However, as can be seen clearly from eq. (1), this is valid only if asset holders have perfect information and perfect foresight about movements of foreign exchange rates[3]. Since no such restrictive assumption is made here, eq. (1) will be used instead.

The following equations characterize aggregate demand conditions of the economy:

$$(2)\quad Y=C\{(1-u)(Y+r\frac{B}{P}),\ r,\ \frac{L+B}{P}\}+G+X(\frac{QE}{P})-\frac{QE}{P}M\{(1-u)(Y+r\frac{B}{P}),\frac{QE}{P},\ \frac{L+B}{P}\},\ 0<C_1<1,\ C_2<0,\ C_3>0,\ X'>0,\ 0<M_1<1,\ M_2<0,\ M_3>0,$$

$$(3)\quad \frac{L}{P}=H(Y,\ r,\frac{L+B}{P}),\ H_1>0,\ H_2<0,\ 1>H_3>0,$$

(4) $X(\frac{QE}{P}) - \frac{QE}{P}M\{(1-u)(Y+r\frac{B}{P}), \frac{QE}{P}, \frac{L+B}{P}\} + \frac{\dot{A}}{P} - \frac{\dot{B}}{P}$
$+ r(\frac{B}{P} - \frac{A}{P}) = 0,$

(5) $\frac{\dot{B}}{P} = J(Y, r, \frac{L+B}{P}, \frac{B}{P}), J_1 < 0, J_2 > 0, J_3 > 0, J_4 < 0,$

(6) $\frac{\dot{L}}{P} + \frac{\dot{A}}{P} = G + r\frac{A}{P} - u(Y + r\frac{B}{P}),$

where

Y = real national income,

C = real private consumption,

u = proportional income tax rate,

B = nominal stock of domestic and foreign bonds honds held by domestic residents in terms of domestic currency[4],

P = domestic price level in terms of domestic currency,

Q = foreign price level in terms of foreign currency,

L = nominal stock of domestic money,

G = real government expenditures,

X = real exports,

M = real imports,

H = stock demand by domestic residents for real balance,

J = flow demand by domestic residents for real domestic and foreign bonds,

A = outstanding stock of bond debts of the domestic government in terms of domestic currency.

Basically, the system above describes a conventional IS-LM-FE model revised by including government budget constraint and stock adjustment equation of bond holdings. Eq. (2) defines equilibrium of the commodity market, or the IS curve, in which real consumption depends upon real disposable income, domestic rate of interest, and real wealth, real exports upon relative commodity price home and abroad, and real imports upon real disposable income, relative commodity price, and real wealth[5]. Eq. (3) or the LM curve depicts that, when the money market attains equilibrium, demand for real balance must be equal to supply, where real · balance demanded is associated positively with both real income and real wealth and negatively with domestic rate of interest. Eq. (4) or the FE curve states that quasi-equilibrium in the foreign exchange market requires surplus in current account to be just offset by deficit in capital account or vice versa, where capital account consists of net inflows of capital and the offsetting movements of interest payments on the existing debts. Assuming actual holdings of real bond to be adjusted gradually towards desired holdings whenever a gap exists between the two figures, eq. (5) specifies flow demand for real bond to be an increasing function of its own rate of return and real wealth and a decreasing function of real income and real stock of bond[6]. Eq. (6) or the government budget constraint indicates that at any instant of time government budget deficits must be financed by money increases or bond floatings.

The logical structure of the system of equations is as follows. Assuming initially that the government budget is balanced. For given G, A, u, L, Q, r*, E* and all parameters represented by these partial derivatives, eqs. (1), (2), (3), and (4) with eq. (5) being substituted in it for B/P then define four independent equations with four unknowns Y, r, E, and B, if P is predetermined. If, as will be shown below, the Jacobian determinant of this system exists, the system can be solved simultaneously for these endogenous variables in terms of these predetermined and exogenous variables and parameters. Suppose further that the government changes its spendings G or tax rate u and at the same time finances the policy change and the resulting budget deficits by money issues or bond sales. The four endogenous variables will continually change values and, if the system is dynamically stable, they will eventually converge to their respectively new equilibrium values.

2.2 The Aggregate Demand Curve

It is possible to reduce this system of equations by substituting for r from eq. (1). Without loss of generality, we can assume initially that $P=Q=E=E^*=1$ and that $B=A$. Total differentiation of equations and rearrangement of terms give rise to[7]

$$(7)\quad \begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix} \begin{pmatrix} bY \\ dB \\ dE \end{pmatrix} = \begin{pmatrix} a_{14} & a_{15} & a_{16} & a_{17} & a_{18} \\ a_{24} & a_{25} & a_{26} & 0 & a_{28} \\ a_{34} & a_{35} & a_{36} & a_{37} & a_{38} \end{pmatrix} \begin{pmatrix} dP \\ dL \\ dE^* \\ dQ \\ dr^* \end{pmatrix} + \begin{pmatrix} dG \\ 0 \\ -dA \end{pmatrix}$$

where

$a_{11}=1-(1-u)(C_1-M_1)>0$;

$a_{12}=-(C_1-M_1)(1-u)r^*-(C_3-M_3)<0$;

$a_{13}=(C_1-M_1)(1-u)(1+r^*)B+C_2(1+r^*)-(X'-M-M_2)<0$[8];

$a_{14}=-(C_1-M_1)(1-u)r^*B-(C_3-M_3)(L+B)-(X'-M-M_2)<0$;

$a_{15}=C_3-M_3>0$;

$a_{16}=(C_1-M_1)(1-u)(1+r^*)B+C_2(1+r^*)<0$;

$a_{17}=X'-M-M_2>0$;

$a_{18}=(C_1-M_1)(1-u)B+C_2\leq 0$;

$a_{21}=H_1>0$;

$a_{22}=H_3>0$;

$a_{23}=-H_2(1+r^*)>0$;

$a_{24}=-(1-H_3)L+H_3B>0$[9];

$a_{25}=1-H_3>0$;

$a_{26}=-H_2(1+r^*)>0$;

$a_{28}=-H_2>0$;

$a_{31}=-M_1(1-u)-J_1\leq 0$[10];

$a_{32}=-M_1(1-u)r^*-M_3-(J_3+J_4)\leq 0$[11];

$a_{33}=(X'-M-M_2)+M_1(1+r^*)(1-u)B+J_2>0$;

$a_{34}=(X'-M-M_2)-M_1(1-u)r^*B-(M_3+J_3)(L+B)-J_4B>0$;

$a_{35}=M_3+J_3>0$;

$a_{36}=M_1(1-u)(1+r^*)B+J_2>0$;

$a_{37}=-X'+M+M_3<0$;

$a_{38}=M_1(1-u)+J_2>0$.

Assuming coefficients a_{ij} in eq. (7) to have signs as specified above, the Jacobian determinant of the matrix on the left-hand side of eq. (7), say $|D|$, can easily be shown to be positive if $|a_{12}\, a_{23}|\geq|a_{13}\, a_{22}|$[12]. It follows that the system can be solved for all endogenous variables in terms of exogenous variables and parameters as follows[13]:

(8a) $Y=\phi(P;\ G,\ L;\ E^*;\ Q,\ r^*)$,

(8b) $B=\sigma(P;\ G,\ L;\ E^*;\ Q,\ r^*)$

(8c) $E=\psi(P;\ G,\ L;\ E^*;\ Q,\ r^*)$.

In particular the relationship in eq. (8a) associating real income demanded G with domestic price level P is viewed as an aggregate demand curve. From eq. (7), it is easily demonstrated that $\partial\phi/\partial P<0$, $\partial\sigma/\partial P\gtreqless 0$, and $\partial\psi/\partial P\gtreqless 0$, Therefore, the aggregate demand curve is indeed downward sloping, but the impacts of price changes on domestic bond holdings and exchange rates are indeterminate.

Graphically, when E is held constant, the IS, LM, and FE curves can be drawn on the (B−Y) dimension as illustrated in Figure 1. From eq. (7), we know that the IS curve has a positive slope, as $dB/dY|IS=-a_{12}/a_{11}>0$, or in words, a rise in real income will cause savings and imports to increase and, to maintain the commodity market in equilibrium, bond holdings and hence real wealth must increase as to reduce savings. Furthermore, a rise in E or depreciation of domestic currency will stimulate exports and discourage imports, and, if the Marshall-Lerner condition is satisfied aggregate demand will increase. Therefore, the IS curve tends to move downward and to the right. The LM curve is unambiguously downward sloping ($dB/dY|LM=-a_{21}/a_{22}<0$) because a rise in real income increases transaction demand for real balance and with money stock being held fixed, bond holdings and hence real wealth have to decline to reduce wealth demand for real balance. A rise in E or a fall in r increases speculative demand for real balance and hence causes the LM curve to shift downward and to the left. Finally, the FE curve is assumed to be negatively sloped as well ($dB/dY|FE=-a_{31}/a_{32}<0$) and to cut the LM curve from above (i.e., $|a_{31}/a_{32}|>|a_{21}/a_{22}|$)[13]. A rise in E leads to expansions of net export surplus and aggregate demand and this moves the

FE curve upward and to the right.

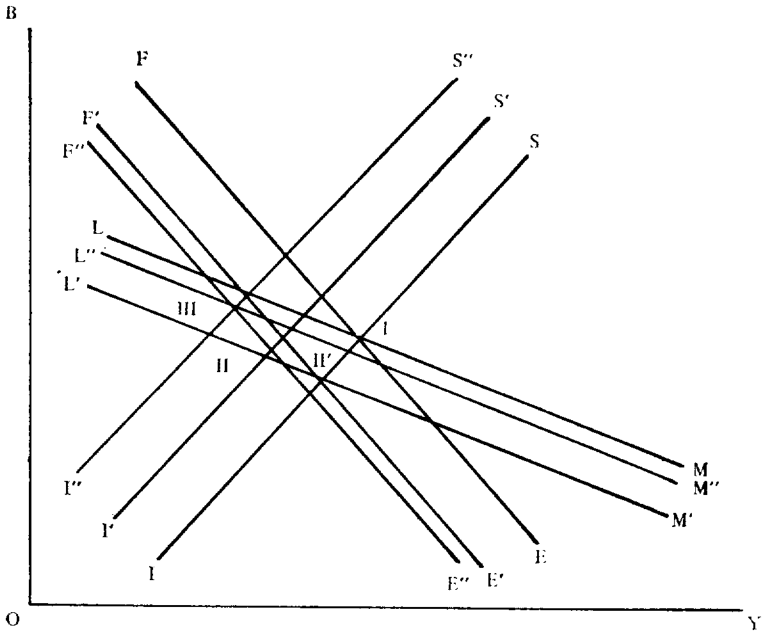

Figure 1.

Assume initially that the economy is at point I in Figure 1 where the three curves intersect and that $P=P_0$ and $E=E_0$. A rise in P restrains exports and stimulates imports and causes the IS and FE curves to shift leftward to I′S′ and F′E′ respectively. As nominal money stock remains unchanged, the rise in P reduces real balance and hence moves the LM curve downward to L′M′. For purpose of illustration, suppose that I′S′ intersects L′M′ at a point, say II, to the left of F′E′, as shown in Figure 1. The foreign exchange appears to have an excess supply, because, comparing with point I′ where the market is in equilibrium, aggregate demand and hence real imports are too small at point W. As E falls, I′S′ shifts upward to I″S″ F′E′ leftward to F″E″, and L′M′ upward to L″M″. When the economy attains point III. aggregate demand falls unambiguously and bond holdings may increase, decrease, or stay unchanged.

2.3 Fiscal and Monetary Policy

Traditionally, an expansionary fiscal or monetary policy was defined as an once-for-all increase in government expenditures with the resulting budget deficits being financed by bond sales or money issues [Blinder and Solow (1974); Turnowsky (1977)]. Specifically, suppose that up to time t, the government budget has been kept in balance. At time t, G is raised by dG, and Y will consequently change to Y+dY, r to r+dr, and B to B+dB. From eq. (6) the budget deficits will then be equal to dG+A dr−u(dY+B dr+r dB), and hence an equal amount of $\dot{A}$ (=dA/dt) or $\dot{L}$ (=dL/dt) must be issued or withdrawn. The change in government debts affects Y, r, B, and hence tax revenues and interest payments, and, if the budget is still not in balance, another bond floating or money increase is required. Here bond or money can function only passively as to accommodate changes of public spendings. However, if the increase in government expenditures is effective only with a time lag, it is legimate to question how the government can finances the initial increase of its outlays. To be consistent with the budget constraint, we propose to define a pure (impure) fiscal expansion as a simultaneous increase of G and $\dot{A}$ ($\dot{L}$) at time t and financing the budget deficits henceafter with $\dot{A}$ ($\dot{L}$). Furthermore, an open-market purchase of bonds involves an exchange of equal value of outside money for government bonds. Adopting such definition for government policy, we obtain from eq. (7), for

$DG = DA = \dot{A} > 0$,

$$(9)\quad dY = \frac{\partial\phi}{\partial G}dG + \frac{\partial\phi}{\partial A}dA > 0,$$

$$dB = \frac{\partial\sigma}{\partial G}dG + \frac{\partial\sigma}{\partial A}dA \gtreqless 0,$$

$$dE = \frac{\partial\psi}{\partial G}dG + \frac{\partial\psi}{\partial A}dA \gtreqless 0.$$

In words, the fiscal impluse stimulates aggregate demand but does not have definite impacts on exchange rate and domestic bond holdings. In Figure 2, the economy is again assumed to be initially at point I with $E=E_0$ and $P=P_0$. The increase in G moves the IS curve rightward to I′S′ and the floating of new bonds ($\dot{A}>0$) shifts the FE curve rightward as well to F′E′. If the impact of bond outflows on supply of foreign exchangs is greater than of import increase on demand for foreign exchange, the I′S′ curve must intersect with the unchanged LM curve at a point, say II, to the left-hand side of F′E′. Consequently, foreign currency depreciates and hence both I′S′ and F′E′ shift to the left to I″S″ and F″E″ respectively, and the LM curve shifts upward to L′M′. When the three curves intersect again at point III, Y rises unambiguously but the change in B is not clear cut.

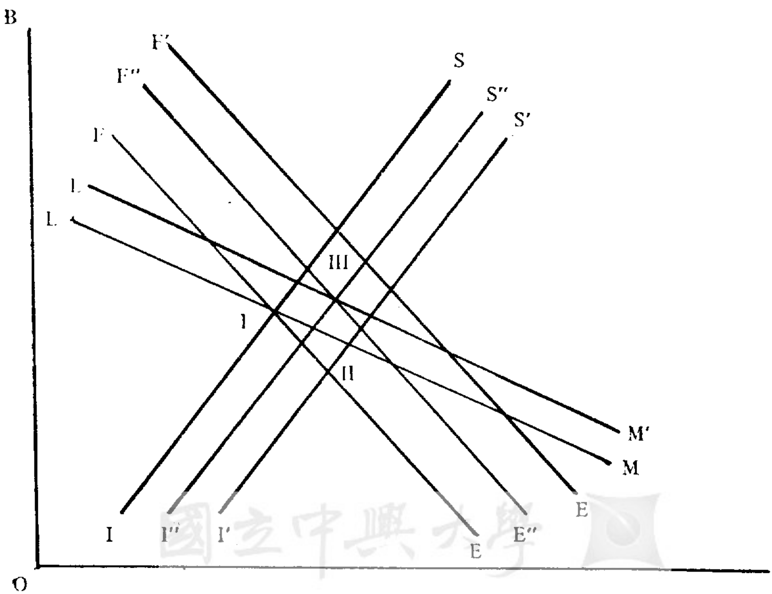

Figure 2.

Now consider an impure fiscal stimulus. For $dG = dL = \dot{L} > 0$, we have from eq. (7) that

$$(10)\quad dY = \frac{\partial \phi}{\partial G} dG + \frac{\partial \phi}{\partial L} dL > 0\,,$$

$$dB = \frac{\partial \sigma}{\partial G} dG + \frac{\partial \sigma}{\partial L} dL \gtreqless 0\,,$$

$$dE = \frac{\partial \psi}{\partial G} dG + \frac{\partial \psi}{\partial L} dL > 0\,.$$

Starting from point I in Figure 3, the rise in G shifts the IS curve rightward to I′S′ and, if wealth effect pn consumption exceeds its effect on imports, the concurrent increase in money stock moves I′S′ rightward again to I″S″. Furthermore, money increase wills shift the LM curve upward to L′M′, unless wealth demand for real balance exceeds unity, and it will cause the FE curve to move inward to F′E′, since wealth increase leads to additional importation of both commodity and foreign bonds. As foreign exchange rate rises in response to excess demand for foreign exchange, I″S″ moves to I‴S‴, L′M′ to L″M″, and F′E′ to F″E″. Aggregate demand increases unambiguously but domestic bonds holdings may increase, decrease, or remain fixed.

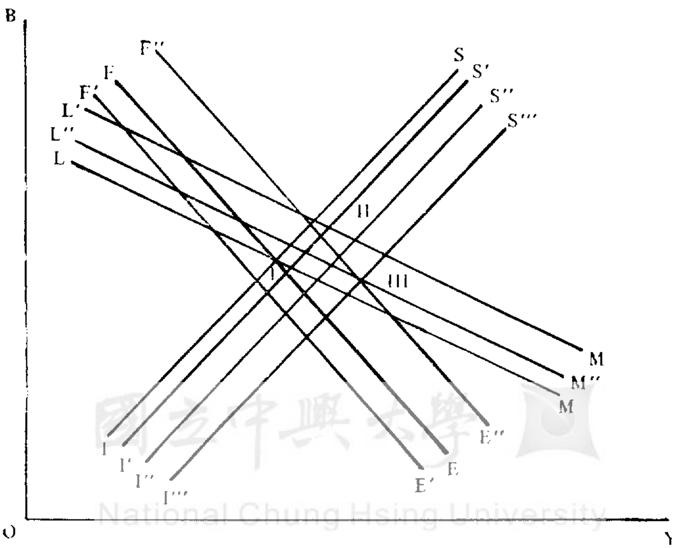

Figure 3.

Finally, an open-market purchase of bonds implies that $dL = -dA > 0$. From eq. (7), we obtain that

$$(10)\quad dY = \frac{\partial\phi}{\partial L}dL - \frac{\partial\phi}{\partial A}dA > 0,$$

$$dB = \frac{\partial\sigma}{\partial L}dL - \frac{\partial\sigma}{\partial A}dA \gtreqless 0,$$

$$dE = \frac{\partial\psi}{\partial L}dL - \frac{\partial\psi}{\partial A}dA > 0.$$

The logic under lying the signs of these multipliers in eq. (10) is as follows. The purchase exerts a downward pressure on domestic interest rate and thus induces capital to outflows and exchange-rate to rise. However, since expected rate of foreign exchange remains unchanged, capital outflows or bond inflows cannot stop domestic rate of interest from declining. Due to the fall in interest rate, domestic consumption and aggregate demand must have increased. Furthermore, depreciation of domestic currency encourages exports, discourages imports, and expands aggregate demand again.

2.4 Impacts of Changes in Other Exogenous Variables

We can also examine the impacts on the three unknowns of changes in any other exogenous variables. We obtain from eq. (7) that

$$(11)\quad \frac{\partial\phi}{\partial E^*} \geq 0,\ \frac{\partial\sigma}{\partial E^*} \geq 0,\ \frac{\partial\psi}{\partial E^*} > 0,$$

$$\frac{\partial\phi}{\partial Q} \geq 0,\ \frac{\partial\sigma}{\partial Q} \gtreqless 0,\ \frac{\partial\psi}{\partial Q} \leq 0,$$

$$\frac{\partial\phi}{\partial r^*} \gtreqless 0,\ \frac{\partial\sigma}{\partial r^*} \gtreqless 0,\ \frac{\partial\psi}{\partial r^*} \geq 0.$$

Consider a rise in E^* first. The anticipated depreciation of domestic currency causes domestic capital to outflow or equivalently, foreign bonds to inflow. Domestic rate of interest tends to rise, which reduces consumption and demand for real balance and hence on this account does not have a clear-cut impact on aggregate demand. However, as new bonds add to private disposable income and private wealth, consumption and aggregate demand increase, if, as assumed, wealth impact on consumption exceeds its impact on money demand. Furthermore, the resulting depreciation of domestic currency due to capital outflows expands net export surplus and aggregate demand as well.

So far as foreign variables are concerned, a conclusion is obtained immediately: the economy is not insulated completely from the rest of the world by the freely floating rate system. A rise in foreign price level stimulates exports and restrains imports and has a direct, positive impact on aggregate demand. Since supply of foreign exchange increases with net export surplus, exchange rate falls and this may offset or reduce initial expansion of aggregate demand. Finally, in response to a rise in foreign rate of interest and the resulting inflows of foreign capital, both domestic interest rate and foreign exchange raet tend to rise; the former restrains aggregate demand, while the latter expands it, and thereforce the net impact is unknown.

2.5 Dynamic Stability of the Aggregate Demand Function

The government budget constraint describes dynamic element of the aggregate demand function. Specifically, after an initial upsurge in public spendings and money or bond stock, the budget will normally be unbalanced. More money or bonds will have to be issued or withdrawn, and this tends to affect the IS, LM or FE curves. If the budget is still not balanced, a further injection or withdrawal of money or bonds is required. The process repeats until the budget attains balance (if the aggregate demand function is stable).

Assuming budget deficits to be purely bond-financing, for given P, G, and other exogenous variables, the budget constraint (6) can then be explicitly expressed as a function of A as follows:

$$\dot{A} = G + \left[\frac{E^*(1+r^*)}{E(A)} - 1\right]A - u\left\{Y(A) + \left[\frac{E^*(1+r^*)}{E(A)} - 1\right]B(A)\right\}.$$

The aggregate demand will be stable and the budget will eventually reach balance, if

$$\frac{d\dot{A}}{dA}=r^*-(1+r^*)(1-u)B\frac{\partial E}{\partial A}-u\frac{\partial Y}{\partial A}-ur^*\frac{\partial B}{\partial A}<0.$$

It can easily be derived from eq. (7) that $\partial E/\partial A<0$, $\partial Y/\partial A>0$, and $\partial B/\partial A>0$. Therefore, sign of $d\dot{A}/dA$ can be positive and the aggregate demand becomes unstable.

On the other hand, under purely money financing, the budget constraint is

$$\dot{L}=G+[\frac{E^*(1+r^*)}{E(L)}-1]\bar{A}-u\{Y(L)+(\frac{E^*(1+r^*)}{E(L)}-1]B[L]\}.$$

Stability of the aggregate demand requires that

$$\frac{d\dot{L}}{dL}=-(1+r^*)(1-u)B\frac{\partial E}{\partial L}-u\frac{\partial Y}{\partial L}-ur^*\frac{\partial B}{\partial L}<0.$$

Sufficient conditions for stability requirement consist of: (i) $\partial E/\partial L>0$, (ii) $\partial Y/\partial L>0$, and (iii) $\partial B/\partial L>0$. As can easily be shown, these conditions will satisfied if $\partial B/\partial L$ ($\gtreqless 0$) is small in value. In the following discussions, we will assume that the the aggregate demand is dynamically stable.

3. The Aggregate Supply Function and Evolutions of Expectations

The aggregate supply function of the economy can be written as

(12) $P=\omega(Y,P^*,QE)$, $\omega_1>0$, $0<\omega_2\leq 1$, $0<\omega_3\leq 1$, $0<\omega_2+\omega_3\leq 1$.

where P^* is expected price level. Eq. (12) assets that domestic price level depends partly on output produced and expected price level, and partly on domestic price of foreign commodities. Let us elaborate the third effect first and then return to the first and second effects. In eq. (12), QE is included as an argument of ω to account for two impacts import price changes may have on domestic prices. First, if imported commodities enter into domestic aggregate production function as inputs, rise in foreign commodity prices of exchange rate directly pushes up domestic cost of production. Secondly, as argued by some economists, exports and imports are determined mainly by the relative competitive position of domestic producers against their foreign counterparts. Any price increase overseas will increase the scope for domestic producers to raise prices for their output without jeopardizing their competitive position[18].

Now consider the first and second effects. In the labor market, labor demanded N is a decreasing function of real wage W/P, or in the inverse-function form:

$$(13)\quad \frac{W}{P} = f(N),\ f' < 0,$$

where W denotes nominal wage rate. On the other hand, due to imperfect information by wage earners of future price changes and lacks of universal wage esclator clause, labor supplied is assumed to be an increasing function of expected real wage as follows:

$$(14)\quad \frac{W}{P^*} = \frac{W}{P}\ \frac{P}{P^*} = g(N),\ g' < 0.$$

For given P and P*, when the labor market attains equilibrium, a unique real wage will equate labor supplied with labor demanded. Combining eqs. (13) and (13′), we obtain

$$(15)\quad f(N) = g(N)\frac{P^*}{P}.$$

Solving eq. (15) for N in terms of P and P* to have

$$(16)\quad N = h(P,\ P^*).$$

Without loss of generality, we assume initially that $P = P^* = 1$. It can be derived from eq. (15) that

$$(17)\quad h_1 = -\frac{g}{f' - g'} > 0,\ \text{and}\ h_2 = -h_1.$$

As M. Friedman (1968) put it, an unanticipated rise in commodity prices results in a simultaneous fall **ex port** in real wages to employers and rise **ex ante** in real wages to employee which enables labor demanded and labor supplied and hence employment to increase. However, as employees adjust price expectations upward and request hike in nominal wages, labor demanded and employment must fall to its original level.

If the economy's production function is specified as $Y = F(N)$, $F' > 0$, substitution for N from eq. (16) will give rise to

$$(18)\quad Y = F[h(P, P^*)] = \tau(P, P^*), \tau_1 = -\tau_2 = F'h_1 > 0 .$$

Holding constant P^*, invert τ to obtain

$$(19)\quad P = \xi(Y, P^*),$$

where $\xi_1 = \overset{-1}{\tau_1} > 0$ and $\xi_2 = -\tau_2/\tau_1 = 1$[14]. Combining eq. (19) with the first effect, we have eq. (12).

Finally, to close the model, the expectations variables must be specified. Since, under certain conditions, rational expectations are indeed generated by an adaptive process [B. Friedman (1975)], we assume that

$$(20)\quad \dot{P}^* = \gamma(P - P^*), \gamma > 0 ,$$

and

$$(21)\quad \dot{E}^* = \rho(E - E^*), \rho > 0 ,$$

where γ and ρ are coefficients of adjustments of price and exchange-rate expectations and are assumed to be constant.

4. Short-run Price, Exchange-rate, and Output

At any instant of time, eqs. (8a), (8c), and (12) form three independent equations which can be solved for three unknowns Y, E, and P, expressed as functions of E^* and P^* and other exogenous variables. Substitution of the solutions into eqs. (19) and (20) will result in a system of the first-order differential equations in P^* and E^* which describe the evolution of the economy over time. Once a steady state is attained, $\dot{P}^* = \dot{E}^* = 0$, and hence $P = P^*$ and $E = E^*$.

Differentiate totally eqs. (8a), (8c), and (12) and then rearrange terms to obtain

$$(22)\quad \begin{pmatrix} 1 & 0 & -\phi_1 \\ 0 & 1 & -\sigma_1 \\ -\omega_1 & -\omega_3 & 1 \end{pmatrix} \begin{pmatrix} dY \\ dE \\ dP \end{pmatrix} = \begin{pmatrix} \phi_2 & \phi_3 & \phi_4 & \phi_5 & 0 & \phi_6 & \phi_7 \\ \sigma_2 & \sigma_3 & \sigma_4 & \sigma_5 & 0 & \sigma_6 & \sigma_7 \\ 0 & 0 & 0 & 0 & \omega_2 & \omega_3 & 0 \end{pmatrix} \begin{pmatrix} dG \\ dA \\ dL \\ dE^* \\ dP^* \\ dQ \\ dr \end{pmatrix}$$

or

(22′) $[D][X]=[C][Z]$,

where, as discussed above, $\phi_1=\partial\phi/\partial P<0$, $\phi_2=\partial\phi/\partial G>0$, and so on. Matrix D in eq. (22′) can easily be shown to be a P matrix if $0\leq\sigma_1\leq1$[15]. Invoking the Gale-Nikaids univalance theorem, this system can be solved uniquely for the three unknowns, for any arbitrary set of values of exogenous variables[16]. We can therefore write

$$\begin{aligned}(23)\quad & Y=Y(E^*,\ P^*;\ G,\ L;\ Q,\ r^*),\\ & E=E(E^*,\ P^*;\ G,\ L;\ Q,\ r^*),\\ & P=P(E^*,\ P^*;\ G,\ L;\ Q,\ r^*).\end{aligned}$$

It can also be derived from eq. (22) that

$$\begin{aligned} & \frac{\partial Y}{\partial E^*}=|D|^{-1}[\phi_5(1-\omega_3\sigma_1)+\sigma_5\omega_3\phi_1]\gtreqless 0,\\ & \frac{\partial E}{\partial E^*}=|D|^{-1}[\phi_5\omega_1\sigma_1+\sigma_5(1-\omega_1\phi_1)]\geq 0,\\ (24)\quad & \frac{\partial P}{\partial E^*}=|D|^{-1}[\omega_1\phi_5+\omega_3\sigma_5]>0,\\ & \frac{\partial Y}{\partial P^*}=|D|^{-1}\omega_2\phi_1<0,\\ & \frac{\partial E}{\partial P^*}=|D|^{-1}\omega_2\sigma_1\geq 0,\\ & \frac{\partial P}{\partial P^*}=|D|^{-1}\omega_2>0,\end{aligned}$$

where $|D|=1-\omega_1\phi_1-\omega_3\sigma_1>0$.

Figure 4 presents a graphical solution of the system as indicated by eq. (23) and also demonstrates the effects of an expected depreciation of domestic currency as given by eq. (24). To begin with, for given E, eq. (22) states that an aggregate demand curve is downward sloping in the (P−Y) dimension as DD in Figure 4, that an aggregate supply curve such as SS in that figure is upward sloping, and that a curve depicting equilibrium in foreign exchange such as EE is a horizontal line, since $dP/dY|EE=0$. By the Gale-Nikaids theorem, the three curves

DD, SS, and EE intersect at point I, when E attains its equilibrium value, for given exogenous variables. A rise in E*, as can easily be determined from eq. (22′), shifts the curve DD upward to D′D′ and the curve EE downward to E′E′. Since at point II, excess demand exists in the foreign exchange market, exchange rate rises unambiguously. The rise in E moves the SS curve and the E′E′ curve upward to S′S′ and E″E″ respectively. When the economy attains its new short-run equilibrium at point III, price P_1 is definitely higher than its original level P, but output may be larger than, small than or equal to previous level.

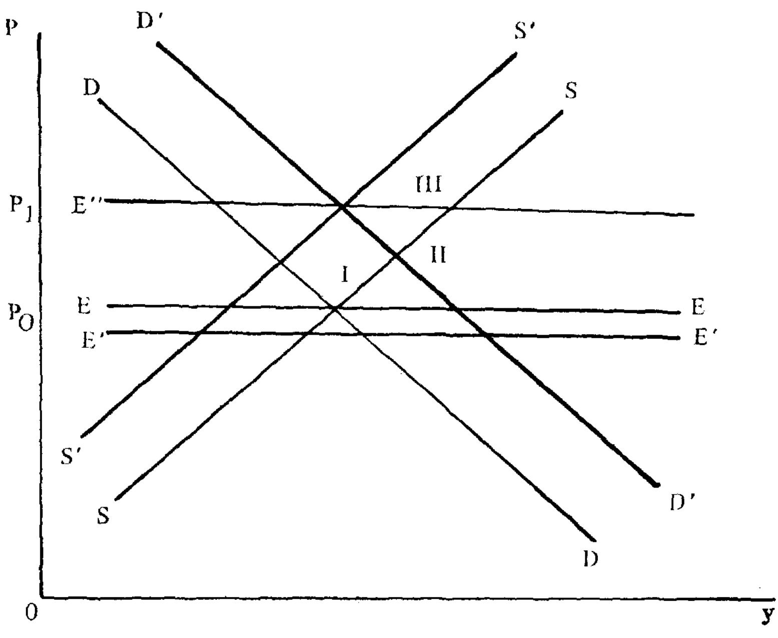

Figure 4.

On the other hand, an anticipated increase in price perceived by workers, and hence a request for hike in nominal wage rate, raises firm's cost of production and thus moves the SS curve upward and to the left (not drawn). Since the DD curve remains unchanged, price must rise and output fall. The increase in domestic price causes domestic currency to depreciate as it reduces exports and increases imports. The rise in foreign exchange rate will result in another upward spiral of domestic cost of production and price.

Now consider the impacts of various government policies. We can also derive from eqs. (22) that, for $dG = dA = \dot{A} > 0$,

$$(25)\quad dY = \left(\frac{\partial Y}{\partial G} + \frac{\partial Y}{\partial A}\right)dG = |D|^{-1}[(\phi_2+\phi_3)(1-\psi_1\omega_3)+(\psi_2+\psi_3)\omega_3\psi_1],$$

$$dE = \left(\frac{\partial E}{\partial G} + \frac{\partial E}{\partial A}\right)dG = |D|^{-1}[(\phi_2+\phi_3)(\omega_1\psi_1+(\psi_2+\psi_3)(1-\phi_1\omega_1))],$$

$$dP = \left(\frac{\partial P}{\partial G} + \frac{\partial P}{\partial A}\right)dG = |D|^{-1}[(\phi_2+\phi_3)\omega_1+(\psi_2+\psi_3)\omega_3].$$

This, if $\psi_2+\psi_3 \geq 0$, or, in words, if the negative impact of bond sales on exchange rate is smaller than or equal to the positive impact of increase in public spendings, a pure fiscal expansion will raise output price, and foreign exchange rate. Graphically, following the simultaneous increase in G and A, the DD curve moves upward (as $dP/dG|DD + dP/dA|DD = -\phi_2/\phi_1 - \phi_3\phi_1 > 0$), while the EE curve may move up, down, or stay unchanged, depending upon $dP/dG|EE + dP/dA|EE = -\psi_2/\psi_1 - \psi_3\psi_1 \gtreqless 0$. If, as assumed, $\psi_2+\psi_3 \geq 0$, the EE curve shifts downward and hence excess demand begins to emerge in the foreign exchange. As exchange rate responds to rise, both the SS and EE curves shift upward. Price rises again but output falls to offset or reduce its initial expansion.

For $dG = dL > 0$, we have

$$(26)\quad dY = \left(\frac{\partial Y}{\partial G} + \frac{\partial Y}{\partial L}\right)dG = |D|^{-1}[(\phi_2+\phi_4)(1-\psi_1\omega_3)+(\psi_2+\psi_4)\omega_3\phi_1] > 0,$$

$$dE = \left(\frac{\partial E}{\partial G} + \frac{\partial E}{\partial L}\right)dG = |D|^{-1}[(\phi_2+\phi_4)\omega_1\psi_1+(\psi_2+\psi_4)(1-\phi_1\omega_1)] > 0,$$

$$dP=\left(\frac{\partial P}{\partial G}+\frac{\partial P}{\partial L}\right)dG=|D|^{-1}[(\phi_2+\phi_4)\omega_1+(\psi_2+\psi_4)\omega_3]>0\,.$$

Since in eq. (26), ψ_2 and ψ_3 are greater than zero, an increase in government expenditures being financed simultaneously by money increase will unambiguously raise ontput, price, and exchange rate. Furthermore, for an open market purchase of bonds, we obtain that

$$(27)\quad dY=\left(\frac{\partial Y}{\partial L}-\frac{\partial Y}{\partial A}\right)dL=|D|^{-1}[(\phi_4-\phi_3)(1-\psi_1\omega_3)+(\psi_4-\psi_3)\omega_3\phi_1],$$

$$dE=\left(\frac{\partial E}{\partial L}-\frac{\partial E}{\partial A}\right)dL=|D|^{-1}[(\phi_4-\phi_3)\omega_1\psi_1+(\psi_4-\psi_3)(1-\phi_1\omega_1)],$$

$$dP=\left(\frac{\partial P}{\partial L}-\frac{\partial P}{\partial A}\right)dL=|D|^{-1}[(\phi_4-\phi_3)\omega_1+(\psi_4-\psi_3)\omega_3].$$

From eq. (10), we know that $\phi_4>\phi_3$. Therefore, an open-market purchase of bonds will also increase output, price, and foreign exchange rate.

Consider a rise in the foreign price. We obtain from eq. (22) that

$$\frac{\partial Y}{\partial Q}=|D|^{-1}[\phi_6(1-\psi_1\omega_3)+\phi_1\omega_3(1+\psi_6)],$$

$$(28)\quad \frac{\partial E}{\partial Q}=|D|^{-1}[\psi_6(1-\phi_1\omega_1)+\psi_1(\omega_3+\omega_1\phi_6)]\gtreqless 0\,,$$

$$\frac{\partial P}{\partial Q}=|D|^{-1}[\omega_3(1+\psi_6)+\omega_1\phi_6].$$

If $1+\psi_6\geq 0$ or if the impact of foreign price on exchange rate does not exceed one, then $\partial Y/\partial Q\gtreqless 0$ and $\partial P/Q\partial>0$. Here we have a case of "imported price increase". Furthermore, examining its components, the imported price increase consists of (i) a direct cost-push factor through upward movement of aggregate supply curve ω_3, (ii) an indirect, reverse cost push factor due to decline in exchange rate $\omega_3\psi_6$, and (iii) a demand-pull factor due to aggregate demand increase $\omega_1\phi_6$. Finally, the impacts of a rise in the foreign rate of interest on output, price, and exchange rate are ambiguous, as can be easily determined from eq. (22).

5. Dynamic Evolution and Stability Analysis

Substituting eq. (23) into eqs. (20) and (21) for P and E respectively, we obtain

$$(29)\quad \dot{P}^* = \gamma[P(P^*, E^*; G, L; Q, r^*) - P^*],$$
$$\dot{E}^* = \rho[E(P^*, E^*; G, L; Q, r^*) - E^*].$$

Given G, L, Q, and r*, eq. (29) is a system of two simultaneous first-differential equations in P* and E* as follows:

$$(30)\quad \dot{P}^* = f_1(P^*, E^*),$$
$$\dot{E}^* = f_2(P^*, E^*).$$

Linearize eq. (30) to obtain

$$(31)\quad \begin{pmatrix} \dot{P}^* \\ \dot{E}^* \end{pmatrix} = \begin{pmatrix} f_{11} & f_{12} \\ f_{21} & f_{22} \end{pmatrix} \begin{pmatrix} P^* & -P_e^* \\ E^* & -E_e^* \end{pmatrix},$$

where $f_{11} = \gamma(\frac{\partial P}{\partial P^*} - 1)$, $f_{12} = \gamma\frac{\partial P}{\partial E^*} > 0$, $f_{21} = \rho\frac{\partial E}{\partial P^*} > 0$,

$f_{22} = \rho(\frac{\partial E}{\partial E^*} - 1)$. and where P_e^* and E_e^* are the steady state values of P* and E*. The dynamic system will be stable if (i) $f_{11} + f_{22} < 0$, and (ii) $f_{11}f_{22} > f_{12}f_{21}$. Sufficient conditions for (i) and (ii) to be satisfied are (iii) $\partial P/\partial P^* < 1$ and $\partial E/\partial E^* < 1$, and (iv) $(\partial P/\partial P^* - 1)(\partial E/\partial E^* - 1) > (\partial P/\partial E^*)(\partial E/\partial P^*)$. Assume that these conditions are met and hence that the system is dynamically stable[17]

Figure 5 presents a phase diagram of the dynamic system depicted by eq. (31). For $\dot{P}^* = 0$, $dP^*/dE^*|_{f_1=0} = -f_{12}/f_{11}$, and thus the curve $f_1 = 0$ is upward sloping as drawn. A rise in P* will drop; to keep P* unchanged, E* must rise to enhance P and thus P*. Furthermore, take an arbitrary point Z on the curve $f_1 = 0$ and then consider a point Z′ lying vertically below Z. In

Z′, E* is the same as in Z, and P* is smaller than Z, so that $df_1 = f_{11}\ dP^* > 0$; it follows that the value of f_1 in Z′ is larger than in Z. Therefore, since $f_1 = 0$ in Z, it must be $f_1 > 0$ in Z′. Since this reasoning can be repeated for all points below the curve $f_1 = 0$, we have that $f_1 > 0$ for all such points; in a similar way it can be shown that $f_1 < 0$ in all the points above the curve $f_1 = 0$.

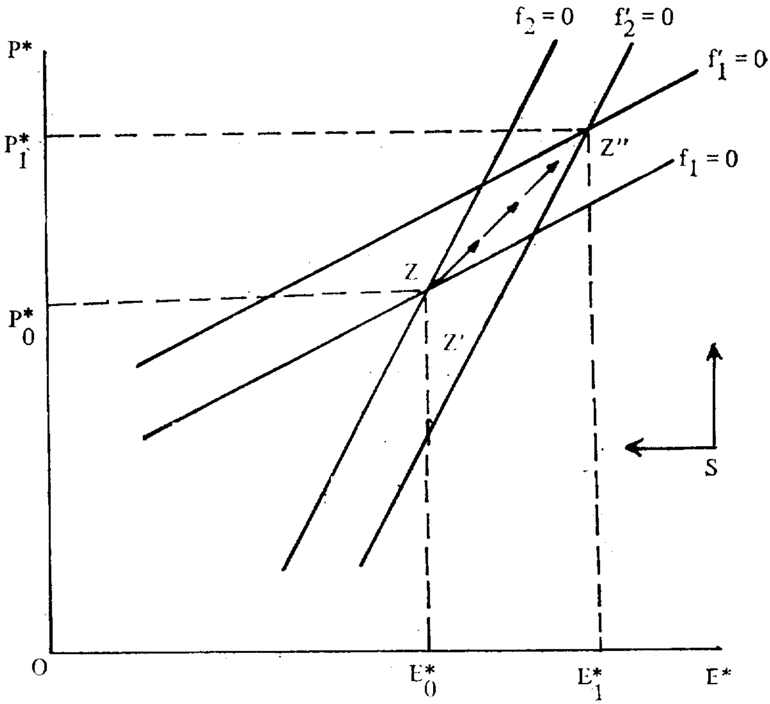

Figure 5.

Similarly, when $\dot{E}^* = 0$, $dP^*/dE^*|f_2 = 0 = -f_{22}/f_{21} > 0$. A rise in E* increases E by a smaller percentage and hence causes E* to fall; to maintain E* unchanged, P* must rise to stimulate P and E*. Furthermore, $f_2 < 0$ for all points to the right of the curve $f_2 = 0$, and $f_2 > 0$ for all points to the left of that curve. Finally, dynamic stability requires that the $f_2 = 0$ curve be steeper than the $f_1 = 0$ curve because $dP^*/dE^*|_{f_2 = 0} - dP^*/dE^*|_{f_1 = 0} = -(f_{11}f_{22} - f_{12}f_{21})/f_{11}f_{21} > 0$.[18]

Now let us consider an arbitrary point such as point S different from point Z in Figure 5. As Z′ lies below the $f_1 = 0$ curve, we know $f_1 > 0$ and so $\dot{P}^* > 0$, i.e., P* tends to increase over-time as the vertical arrow points upward. Since S also lies to the right of the $f_2 = 0$ curve, we know $f_2 < 0$ and hence $\dot{E}^* < 0$ and E* decreases overtime as the horizontal arrow points to the left. As both arrows from S point towards equilibrium, the point Z is stable.

Suppose, for example, that begining from point Z in Figure 5, government increases its spendings and finances them at the same time through issues of now money. First, we obtain from eq. (28) that, for given E*, $dP/dG|f_1 = 0 = -\frac{\partial P}{\partial G}/(\frac{\partial P}{\partial P^*} - 1)$, the sign of which is positive. It follows that the curve $f_1 = 0$ will shift upward to, say, $f'_1 = 0$. This is certainly so since the simultaneous increases in government expenditures and money stock pull up price unambiguously and, in response to this unexpected price rise, workers will adjust upward their expectations gradually. On the other hand, also for given P*, $dE^*/dG|f_2 = 0 = -\frac{\partial E}{\partial G}/(\frac{\partial E}{\partial E^*} - 1) > 0$, and therefore, the $f_2 = 0$ curve must shift to the right to, say, $f'_2 = 0$. Indeed, the expansion in this non-pure fiscal action causes domestic currency to depreciate and, in response to this unanticipated depreciation, asset holders home and abroad will raise their expected foreign rate graduately. The economy will therefore approach directly or cyclically to the new steady state Z″.

How does this non-pure fiscal expansion affeat the path of real income? When the economy is at the steady state Z in Figure 5, real income is to take its equilibrium value Y_0. The fiscal action raises Y_0 to, say, Y_1, where Y_1 exceeds Y_0. From eq. (23), we have

(32) $\dot{Y} = \frac{\partial Y}{\partial E^*}\dot{E}^* + \frac{\partial Y}{\partial P^*}, \dot{P}^*,$

where $\dot{G} = \dot{L} = \dot{Q} = \dot{r}^* = 0$. For expository purpose, assume that

$\partial Y/\partial E^*=0$ (see eq. (24)). Therefore, when E^* and P^* move along the trajectory ZZ″ in Figure 5, real income must fall from Y unambiguously. An interesting question arises immediately: will real income declines to or even be below its previous equilibirum value Y_0 when the economy attains the new steady state Z″? For this and other questions, we turn to the steady-state solution of the system.

6. The Steady State

Define the steady state as a situation where (i) the expected price and expected exchange rate are equal to the actual price and actual exchange rate respectively; (ii) no international flow of capital takes place; (iii) the government budget is in balance; and (iv) the domestic price is equal to the foreign price expressed in terms of domestic currency. What are the implications of these conditions?

Eq. (12) implies that, when $P=P^*=QE$, P is a function of Y only or $P=\omega(Y)$ and $\omega' \gtreqless 0$ according to $\omega_2+\omega_3 \gtreqless 1$. In particular, if $\omega_2+\omega_3=1$, $\omega'=\infty$ and the long-run aggregate supply curve is a straight line vertical to the Y axis. This is of course the familiar case of classical dichotomyg in which real income and other real variables are determined in the real sector and are in no way affected by monetary or fiscal policy. In the following discussion, the assumption that $\omega_2+\omega_3=1$ will be made.

In eq. (1), when $E^*=E$, we have $r=r^*$. In the steady state, asset holders are perfect foresight about movements of exchange rate and perfect capital mobility will ensure equality of domestic and foreign rates of interest. However, as will be verified below, the familiar Mundell's proposition about relative effectiveness of fiscal and monetary policy under the freely floating rate system only holds if budget deficits are financed by bond sales. In the case where deficits are fianced by money increases, the proposition is just reversed.

When $P=QE$ and $\dot{A}=\dot{B}=0$, eq. (4) can be written to be

$$(4') \quad \bar{X} - M\{(1-u)(Y^e + r^*\frac{B}{P}), \frac{L+B}{P}\} + r^*(\frac{B}{P} - \frac{A}{P}) = 0,$$

where $\bar{X}$ is a constant and Y^e is the constant steady state value of Y. Thus, even in the steady state, domestic trade account should be kept in surplus to meet a constant interest payments on debts to foreigners.

Substituting eq. (4′) into eq. (2), the steady state of the economy is characterized by

$$(33a) \quad Y^e = c\{(1-u)(Y^e + r^*\frac{B}{P}),\ r^*, \frac{L+B}{P}\} + G - r^*(\frac{B}{P} - \frac{A}{P}),$$

$$(33b) \quad \frac{L}{P} = H(Y^e,\ r^*, \frac{L+B}{P}),$$

$$(33c) \quad G + r^*\frac{A}{P} - u(Y^e + r^*\frac{B}{P}) = 0,$$

where eq. (33c) is the stationary solution to the budget constraint (6). When budget deficits are financed by bond sales, L is an exogenous variable and eqs. (33a), (33b), and (33c) yield the steady-state solutions for B, A, and P. Under money fiancing, A is fixed and these equations can be solved for B, A, and P. Once P is known, the steady state rate of foreign exchange can be determined immediately from the redationship that $P = QE$.

As Q does not appear in eqs. (33a), (33b) or (33c), we can soon establish that the solutions to B, P, A or L are independent of it. Since P is not affected by changes in Q, it follows that $\partial E/\partial Q = -1$. In the steady state, the small open country is completely insulted from the rest of the world by the freely floating exchange rate.

Under bond-financing, these equations can be further reduced by solving eq. (33c) for $(G + r^*\frac{B}{P})$ and then substituting its solution into eq. (33a) to obtain

$$(33d) \quad (1-u)Y^e = C\{(1-u)(Y^e + r^*\frac{B}{P}),\ r^*, \frac{L+B}{P}\} - r^*(1-u)\frac{B}{P},$$

where L is a constant. Since both eqs. (33d) and (33b) do not contain G and A, the steady state values of B and P are not functions of them. It follows that under bond-fiancing, an increase in government expenditures has no effect on these endgenous variables. Undertaking comparative static analysis, we derive from eqs. (33d) and (33b) that $(\partial P/\partial L)(L/P) = (\partial B/\partial L)(L/B) = 1$; a one percentage increase in money stock (through open-market purchases) raises by the same percentage domestic price and nominal bonds held by domestic citizens. This proves Mundell's proposition that fiscal policy is impotent and monetary policy is effective.

When budget deficits are fianced by money increase, L is also an endogenous variable and A is government controlled variable. Performing comparative static analysis, we obtain from eqs. (33a), (33b), and (33c) that signs of $\partial B/\partial G$, $\partial P/\partial G$, and $\partial L/\partial G$ are all positive. On the other hand, since L is to be determined from the system, an increase in it by the government does ont change the steady state solutions to B, P, and L. Therefore, under money-fiancing, monetary policy is impotent and fiscal policy is effective. Finally, since it can easily be shown that signs of $\partial B/\partial A$, $\partial P/\partial A$, and $\partial L/\partial A$ are also positive, increase in government bonds through open-market sales must be effective too.

7. Conclusions

This paper has attempted to generalize the familiar IS-LM-FE framework of most Keynesian open macroeconomic models to allow for the intrinsic dynamics of a small economy stemming from interactions between stock and flow variables. It purports to analyze both the short-run impacts and long-run effects of monetary and fiscal actions on aggregated demand, output, price, and exchange rate. Assuming that asset holders home and abroad do not possess perfect foresight about changes in price and exchange rate, this paper has demonstrated that perfect capital mobility need not imply continued equality of domestic and foreign rates of interest, thus enabling fiscal or monetary policy to affect aggregate demand in the short run. Another important phenomenon also arising from that assumption is the incomplete insulation of this small open economy from the rest of the world even under the freely floating-rate system.

This paper has also shown that in the steady state where movements of price and exchange rate are perfectly perceived, the familiar Mundell's proposition, that, if international capitals are perfectly mobile, fiscal policy is impotent and monetary action is effective, holds true only when government budget deficits are financed by bond sales. On the contrary, if deficits are financed instead by money increases, Mundell's predictions are just reversed.

1. No forward exchange market is assumed to exist.
2. Instead, Turnovsky wrote eq. (1) to be $r=r^*+e$, where e is rate of appreciation in foreign exchange [Turnovsky (1977), ch. 12]. From eq. (1), we obtain that since $E^*/E=1+e^*$, $r=r^*+e^*+e^*r^*$, where e^* is expected rate of appreciation, therefore, Turnovsky's specification is correct if $e^*=e$ and if $e^*r^*=0$.
3. The conventional specification can be true in another, but equally restrictive, situation. Assume that forward markets exist and let E^* in eq. (1) represents forward rate. Thus, if we assume no premium or loss on forward over spot rates, r will be equal to r^*. This implies either that speculators are perfecly certain to forward exchang rate or that asset holders view domestic and foreign bonds as perfect substitutes or both.
4. Since expected rates of return on domestic and foreign bonds are assumed in eq. (1) to be always equal, by the Hicks' composite good theorm, these two kinds of bonds can be viewed as one asset.
5. To avoid complications arising from adjustments in capital stock and other variables due to non-zero investment, it is assumed, but unrealistically, that all commodities produced home and abroad are perishable consumer nondurables. Therefore, there is no investment function in eq. (2).

6. Traditionally, perfect capital mobility is taken to imply adjustments of actual holdings towards desired holdings to take place very rapidly as to ensure that in eq. (5), J_2 approaches positive infinity and $\dot{B} = 0$. Since in this paper outflows of capital may cause anticipated rate of foreign-exchange to change, these two assumptions will not be made.
7. du is ignored in eq. (7), because its impacts on endogenous variables can easily be shown to be just reversed to those of dG.
8. Assume initially that the trade account is in balanced. Then, $X' - M - M_2 = X\left(\frac{X'}{X} - \frac{M_2}{M} - 1\right) = X(n_f + n_d - 1)$, where n_d and n_f are domestic and foreign import demand elasticities respectively. If, as will be assumed, the Marshall-Lerner condition is met, i.e., if $n_f + n_d > 1$, then it seems reasonable to postulate that $a_{13} < 0$.
9. As price falls and nominal money keeps constant, real money supply must increase. However, the decline in price also increases real wealth and hence increases wealth demand for real balance. We assume the former exceeds the latter and hence $a_{24} < 0$.
10. It is assumed that propensity to import with respect to disposable income exceeds the negative impact of real income on demand for bonds.
11. As domestic bond holdings accumulates, both real disposable income and real wealth rise and hence import demand increases. However, further bond demand may be discouraged if wealth demand for bonds is smaller than the adjustment coefficient of actual bond holdings to desired holdings. It seems not unreasonable to assume the increase in import demand exceeds the decrease in bond demand.
12. The reason for making assumption is pragmatic. As indicated in the text, a rise in E moves the FE curve to the right and the LM curve downward, only under the assumed relative slope of these curves will the new intersection indicates a

higher level of aggregate demand, thus conforming to a general proposition from simple Keynesian models that depreciation increases real income.

13. For further elaboration of this point see Taylor, Turnovsky and Wilson (1973).
14. This implies that, in a one-commodity-and-one-input model, the coefficient for expected price variable in the aggregate supply function must be unity, as assumed by some monetarists [see, for example, Friedman (1968); Stein (1976)].
15. It was derived above that $\psi_1 \gtreqless 0$. Therefore, it seems not absurd to impose such as condition.
16. A square matrix is defined to be a P matrix if all its principal minors are positive. If this condition is met, the Gale-Nikaids global univalence theorem ensures that the system can be solved uniquely everywhere for the endogenous variables. See Gale and Nikaid (1965).
17. If the values of ω_3, ϕ_5 and ψ_5 do not exceed unity, then it seems not unreasonable to make such an assumption.
18. If the relative slope of the two curves is reversed, the dynamic system can be shown to generate a saddle point which is unstable.

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小型開放經濟之總體模式
—凱恩斯方法之修正

張　　慶　　輝*

摘　　要

本文旨在修正凱恩斯 IS-LM-FE 模式，以涵蓋最近總體理論內幾個重要的發展。第一、政府融通預算赤字所增發之貨幣或公債，引起私經濟部門財富之累積，對就業與所得等產生作用。第二、國際資本移動與收支餘額之交互作用，並對國際資產握存發生累積的作用。第三、對一般物價與外滙滙率之預期及不同期間之調整，必定影響模式內重要內生實數如物價、所得與就業等。利用此一較具一般性之總體模式，本文除探討貨幣與財政政策之短期與長期效果外，更在適當地方討論動態演變及穩定條件。

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