Monetary and Fiscal Policy in Open, Interdependent Economies with Fixed Exchange Rates

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Chapter 12.1

MONETARY AND FISCAL POLICY IN OPEN, INTERDEPENDENT ECONOMIES WITH FIXED EXCHANGE RATES

Karl BRUNNER and Allan H. MELTZER

1. Introduction

Analysis of open economies has been restricted in several important ways. One is the assumption, common also in much of the macro-economic analysis of a closed economy, that total output is fixed and invariant. A second restriction arises from treatment of the representative country as a small unit in a large market. All prices are set in competitive world markets, and exchange rates adjust to equate domestic and foreign prices. Three, asset portfolios are restricted to money and real capital, the latter is generally fixed or grows at a steady rate. Bonds and real capital are perfect substitutes, as in the Metzler model (1951) or Mundell's several extensions of that model (1968).

Lending and borrowing is the most common means by which countries with fixed exchange rates adjust short-term imbalances in trade or payments. Short- or long-term capital movements have long been recognized as a means of adjusting or disturbing the equilibrium of open economies with fixed or floating exchange rates. Recent work by Dornbusch (1973), McKinnon (1969) and Myhrman (1976) attempts to analyze stock-flow interaction in open economies. However, there is no analysis linking short-term movements of output and prices to the long-run analysis that is the standard fare of international economics.

In this paper, we analyze economies with markets for assets and output. Countries and their citizens borrow and lend at home and abroad. Governments have budget deficits or surpluses and issue or retire bonds or money. All of these decisions affect interest rates, output, and the prices of assets and output in the home country and abroad. They affect, also, the balance-of-payments position in a system with fixed exchange rates.

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We begin with a closed economy. Changes in fiscal and monetary policy alter the short- and long-run position of the economy and the prices of assets and output. We show the adjustments as a sequence of equilibria, from short- to long-run equilibrium. Then we open the economy to trade and capital movements and, using the closed economy short- and longer-run equilibria as building blocks, we show the interaction of the home country and the rest of the world. Throughout capital stocks generally remain fixed. Changes in anticipations of future prices and in technology are neglected throughout.

2. A Model of a Closed Economy

The closed economy from which we start has three main sectors described by markets for assets and output and a government budget equation. In the background is a labor market, important for long-run but not short-run adjustment. Four processes of adjustment occur: (1) a short-run flow adjustment to given stocks represented by the response of the output market to changes in the position of the asset markets; (2) an intermediate-run adjustment of the asset markets determined by the interaction of the asset markets, the output market and the government's budget position; (3) a longer-run adjustment of employment and the labor and output markets; and (4) long-run adjustment of capital stock and wealth. This section presents the model.

Equilibrium on the output market occurs when the output of the private sector, \( y \), equals the real expenditure of the private sector, \( d \), and of the government, \( g \),

\[
y = d(i - \pi, p, P, W_n, W_h, e) + g, \quad d_1, d_2 < 0, \quad d_3, \ldots, d_6 > 0.
\]  

(1a)

Private decisions to purchase depend on the market rate of interest, net of any inflation premium, \( i - \pi \), the price level of current output, \( p \), the price of outstanding assets (or the market value of a unit of real capital), \( P \), the market value of wealth both human, \( W_h \), and non-human, \( W_n \), and the anticipated return to real capital, \( e \). \( W_h \) and \( e \) depend on tax rates, \( \tau \), and income or anticipated income if the two are distinguished. \( W_h \) also depends on money wages, \( w \), and the absorption of labor by the government, \( l_g \),

\[
W_h = W(y, w, p, l_g, \tau), \quad W_1, W_2, W_3, W_4 > 0, \quad W_5 < 0,
\]  

(1b)

\[
e = e(y, K, \tau), \quad e_1 > 0, \quad e_2, e_3 < 0.
\]  

(1c)
Non-human wealth consists of base money, $B$, government securities, $S$, and real capital, $K$,

$$W_n = PK + v(i, \tau)S + (1 + \omega)B, \quad v_1, v_2 < 0. \quad (1d)$$

Securities are issued at par and valued at market prices with valuation, $v$, dependent on market interest rates and tax rates. The parameter $\omega$ is the net worth multiplier of the banking system including the Pesek-Saving effect of non-competitive banking arrangements.

A price-setting function completes the description of the output market. For given anticipations output prices, $p$, depend on money wages (per efficiency unit), the capital stock, and output,

$$p = p(y, K, w), \quad p_1, p_3 > 0, \quad p_2 < 0. \quad (1e)$$

There are two asset markets. On the credit market, the public supplies earning assets to banks, and the banks make loans and purchase securities. The stock of outstanding securities is distributed between banks and the public. On the money market the banks produce and the public absorbs the nominal stock of money. Together, the asset markets determine $i$ and $P$ for given conditions on the output and labor markets.

Two equilibrium conditions summarize the interaction of the banks and the public. The banks’ portfolio—the product of an earning asset multiplier, $a$, and the monetary base, $B$—equals the public’s supply of earning assets to banks, $\sigma$.

The latter is the sum of loans from banks and the public’s excess supply of securities, $S - Sp$, with $Sp$ the stock of securities held by non-banks,

$$a(i, P, W_n, W_h, e \ldots)B = \sigma(i - \pi, p, P, W_n, W_h, e, S), \quad (2)$$

$$a_1, a_2, a_3 > 0, \quad a_4, a_5 < 0,$$

$$\sigma_1, \sigma_3 < 0, \quad \sigma_2, \sigma_4, \sigma_7 > 0.$$ 

The stock of money is the product of a money multiplier, $m$, and the monetary base. The money market is assumed to proximately determine $P$, and the bank credit market proximately determines $i$. The force of these assumptions is that, whenever the credit market and money market response differ, interest rates change in the direction implied by the credit market equation and asset prices change in the direction implied by the money market equation, $^1$

$^1$Without this restriction, the signs of some of the responses below would be indeterminate. The point is developed in greater detail in Brunner and Meltzer (1972). The missing items in equations (2) and (3), represented by dots, include policy variables such as reserve requirement ratios and the rediscount rate and variables reflecting the institutional arrangements applicable to particular countries.
\[ m(i, P, W, e, \ldots)B = L(i, e, P, W, t), \]
\[ m_1, m_4, m_5 > 0, \quad m_2, m_3 < 0, \]
\[ L_1, L_2 < 0, \quad L_3, \ldots, L_6 > 0. \]

The government's budget equation describes the budget position and the financing of deficits or surpluses. Expenditure consists of purchases of goods, \( pg \), purchases of labor services, \( wlg \), and interest payments, \( I(i)S \). The government hires labor at the market wage rate without regard to productivity in governmental activities. Interest payments depend on the maturity structure of the debt and increase with market rates; \( I > 0 \). Tax collections rise and fall proportionally as prices and output change. Tax rates are fixed.\(^2\) Base money and securities,

\[ pg + wlg + I(i)S - t(p, y, wlg ; \tau) = B + \delta, \]

are issued to finance deficits and withdrawn in the event of a surplus.

Equation (5) is a summary description of the labor market in the form of a generalized Phillips curve. The acceleration or deceleration of money wages depends on changes in the rate of inflation and on the deviations of current output from the output that prevails in long-run equilibrium.\(^3\) With efficient use of resources, all profitable opportunities realized, unchanging policies and a given stock of capital, \( y = y_0 \). Increases in capital and labor force raise \( y_0 \); increased absorption of labor by the government lowers \( y_0 \).\(^4\)

\(^2\)Proportional tax rates could be replaced by progressive tax rates and the assumptions that households expect either (1) tax reduction or (2) a rising share of output to be absorbed by government as prices and output rise and conversely when prices and output fall.

\(^3\)If technology were permitted to change, money wages would not be required to fall at times of excess supply. Deceleration of wages often would be sufficient to restore equilibrium. Equation (5) would be rewritten as a relation between the acceleration or deceleration of money wages per efficiency unit and the acceleration or deceleration of prices.

\(^4\)Long-run output, \( y_0 \), also depends on \( K \), but \( K \) is fixed. Extension of the analysis to a world of changing capital can be made by letting the sum of net investment, \( K \), plus depreciation, \( \delta K \), be proportional to total private expenditure, \( d \). The derivatives of the \( d \)-function are then weighted averages of the response of consumer expenditure and investment expenditure, and the distribution of output between investment and consumption depends on relative prices. The current capital stock is the sum of prior net investment. Specifically, \( (K + \delta K)/d = k(l - \pi, p, P, e) \) and \( K = f K \).
3. Solution Procedure

The system of equations yields solutions for prices and output once the values of the policy variables—g, lg, r, and either B or S—and the capital stock and labor force are given or fixed. Our procedure distinguishes short-, intermediate- and longer-run solutions by first imposing and later relaxing restrictions on adjustment. In this section, we discuss the sequential procedure and the solution to the closed economy model at various runs. In the following section, we analyze monetary and fiscal changes and determine the signs of the principal responses on the markets for assets and output.

There are four types of variables. One is policy variables; the current values of these variables are set by the decision of government. These include g, lg, r, and either B or S or some combination of B and S, for example, the portion of the deficit or surplus financed by issuing or withdrawing base money and securities. Such other policy variables as reserve requirement ratios, the rediscount rate, borrowing quotas and the like can be included in the asset market equations. In the open economy model with fixed exchange rates, the exchange rate is an additional policy variable. Two, in a closed economy current values of B and S represent the history of deficit finance and open market operations. In an open economy, B includes the cumulated balance-of-payments deficit or surplus. We treat B and S as determined relative to the current market process. Three, w, K, y, and π are neither controlled by policy-makers nor affected by short-run changes on the markets for assets and output. Money wages adjust gradually to market conditions, as shown by equation (5), and our longer-run equilibrium recognizes the effects of changes in w on prices and output. Additional equations would be required to analyze the adjustment of K and π and the effect of their adjustment on the markets for assets and output. Four, all remaining variables are determined by the system of equations. Our stylized procedure treats the solution as a series of runs to recognize differences in the adjustment process on the markets for assets, output and labor.

The notation attempts to make explicit the variables held constant in a particular adjustment. The short-run response of the asset markets to changes in policy variables is an adjustment of the prices, P and i, at which nominal stocks are willingly held. The solutions are obtained from equations (2) and (3) holding constant the position of flow equilibrium but recognizing the dependence of W, and e on y. The solutions for P and i can be written as

\[ P = P(y, p, B, S; K, w, \pi), \]  

(6a)
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\[ i = i(y, p, B, S; K, w, \pi). \]  

(6b)

Partial elasticities are obtained from these solution equations by differentiating and expressing the results as elasticities. The partial elasticities describe the response of \( P \) and \( i \) to current values of \( B, S, p \) and \( y \) holding constant the position of the output market and the government budget equation. We use the symbol \( AM \), for example, \( e(P, B|AM) \), to denote the elasticities obtained from the asset market equations.

The solutions for \( P \) and \( i \) that satisfy the two-asset market equations also determine the nominal stocks of money and credit. The equilibrium stocks of money and bank credit, \( M \) and \( \sigma \), depend on \( P \) and \( i \) and on the variable in equations (6a) and (6b).

To find the short-run equilibrium position of the output market, we substitute the solutions for \( P \) and \( i \), denoted \( P \) and \( i \), obtained from the asset market equations in equation (1a). The \( d + g \) curve of figure 1 is an equilibrium

![Figure 1](image-url)
relation, equation (7), drawn in the $p, y$ plane. $K$, $w$ and $\pi$ are held constant, and as before, the dependence of $W_0$ and $e$ on $y$ and $p$ is recognized,

$$y = d\{i(B, S, y, p|AM), \dot{P}(B, S, y, p|AM), p, y, B, S; K, w, \pi\} + g. \quad (7)$$

The $d + g$ line is the locus of all $p, y$ combinations satisfying simultaneously the markets for output and assets for given values of all stock variables and anticipations. Equation (7) implicitly defines $p$ as a function of $y$ for any values of the remaining variables. We can derive a measure of the slope of the $d + g$ line by differentiating (7) with respect to $y$ and expressing the result as an elasticity. We use the notation $\varepsilon(p, y|d + g)$ to denote this slope, and we use $\varepsilon(p, B|d + g), \varepsilon(p, g|d + g), \varepsilon(p, S|d + g)$ to denote the change in $p$, holding output constant, induced by monetary and fiscal policies. These elasticities are shown as vertical shifts of $d + g$ in figure 1. The vertical shift $p_2 - p_0$, with $y = y_0$, shows the response to an expansive policy action obtained from equation (7).

The short-run equilibrium position of the output market is at $p_1 y_1$, not at $p_2 y_0$. Short-run changes in output are described by the $s$-curve of figure 1, equation (1e) with $K$ and $w$ held constant. The short-run equilibrium reached after a change in fiscal or monetary policy is obtained by solving equations (7) and (1e), given the values of $B, S, K, w$ and $\pi$ and the position of the budget equation. We use the notation $O, AM$ to show that the short-run position includes the response of the output market ($O$) and the asset market ($AM$).

Short-run equilibrium is a flow equilibrium. Asset prices and interest rates change, and the stocks of money and credit change, but the stock equilibrium position at the intersection of the budget equation and $y = y_0$ remains unchanged. The stocks of financial assets have not adjusted to an equilibrium position consistent with the prevailing budget position, and $p$ and $y$ are not fully adjusted to the values of asset stocks that must obtain in a stock-flow equilibrium.

A balanced budget is a necessary and sufficient condition for stock equilibrium in a closed economy with fixed capital stock. From equation (4), we see that when $\dot{B} = \dot{S} = 0$, the budget is balanced, asset stocks are constant, and total nominal government expenditure, $G$, equals tax collections $t$. After substituting for $i$ in equation (4), we can write the stock equilibrium as

$$G[i(p, y, B, S|AM), S; g, w, lg] = t(p, y; \tau). \quad (8)$$

Equation (8) is shown in figure 1 as the bbe line. The line shows positions of budget balance. To the right of the line, the budget has a surplus; to the left, the budget has a deficit. In both cases, the stocks of financial assets change. The
slope of the line, expressed as a partial elasticity, is denoted $\varepsilon(p, y|\text{bbe})$. The position of the line depends on the values of current policy. Changes in policy change the position of the bbe line. The response to the base is denoted $\varepsilon(p, B|\text{bbe})$ and similarly for other variables.

An intermediate-run equilibrium is a position of stock-flow equilibrium at the intersection of the bbe line and the flow equilibrium. The budget is balanced, and $P$, $i$, $p$ and $y$ have adjusted to the values of $B$, $S$, $g$ and $\tau$ consistent with budget balance. There is no change in $K$, $w$ or $\pi$, so the position of the $s$-curve remains unchanged. In figure 1, the intersection of a $d + g$ curve, $s$, and bbe at $p_2 y_2$ is a position of intermediate-run equilibrium.

Gradual adjustment of money wages, as shown by equation (5), moves the economy from an intermediate-run to a longer-run equilibrium. Capital stock is held constant in the longer-run equilibrium, but output and prices change in response to a change in $w$. Changes in $w$ alter the government's budget and the position of the bbe line and, by changing $W_h$, change expenditure. Output prices rise and fall with $w$, and the equilibrium position moves in the direction of full equilibrium at $y = y_0$. To identify the longer-run equilibrium response of $p$ and $y$ to $g$, we use $\varepsilon(y, g|O, AM, s)$ and $\varepsilon(p, g|O, AM, s)$ and similarly for $B$, $S$, or other policy variables.

A return to full steady-state equilibrium following policy changes, particularly fiscal changes, requires adjustment of $K$ and $y_0$. We do not analyze changes in the composition of output between consumption and investment here, and we do not take into account the effects on output and prices of the adjustment of the capital stock.

4. Responses to Fiscal and Monetary Policy

The general procedure we have just described provides the framework within which we analyze the response of the closed economy to fiscal and monetary change. The framework becomes applicable to an open economy after adjustment to permit interaction of home country markets with markets in other countries and to recognize the influence of the balance of payments. In this section, we develop the closed economy framework more fully and show the determinants of the size and direction of responses on the markets for assets and output.

We begin with the output market. The $d + g$ curve, equation (7), relates aggregate real expenditures to market prices, to existing stocks and to policy variables. The slope of the curve in the $p, y$ plane can be expressed as an elasticity,
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\[ \varepsilon(p, y|d + g) = \frac{1 - (1 - \gamma)\bar{\varepsilon}(d, y)}{(1 - \gamma)\bar{\varepsilon}(d, p)} < 0. \]

The parameter \( \gamma \) is the proportion of output absorbed by the government, \( g/y \). The numerator and denominator contain total elasticities (shown by a bar over \( \varepsilon \)) of the output market, including the response of \( P \) and \( i \) on the asset market. Signs of components appear beneath the components,

\[ \bar{\varepsilon}(d, p) = \varepsilon(d, p) + \varepsilon(d, i)\varepsilon(i, p|AM) \]
\[ + \varepsilon(d, P)\varepsilon(P, p|AM) + \varepsilon(d, W_h)\varepsilon(W_h, p) < 0, \]

and

\[ \bar{\varepsilon}(d, y) = \bar{\varepsilon}(d, i)\varepsilon(i, y|AM) + \bar{\varepsilon}(d, P)\varepsilon(P, y|AM) \]
\[ + \varepsilon(d, W_h)\varepsilon(W_h, y) + \varepsilon(d, e)\varepsilon(e, y) > 0. \]

The elasticities of \( i \) and \( P \) are the responses of interest rates and asset prices to any variable taken as predetermined when solving for \( P \) and \( i \) on the asset markets. We use \( \bar{\varepsilon}(d, i) \) and \( \bar{\varepsilon}(d, P) \) to note that these elasticities include the change in wealth induced by changing \( i \) and \( P \).

The total price elasticity of expenditure, \( \varepsilon(d, p) \), is negative despite the positive term at the end. Homogeneity of degree zero of the \( d \)-function in prices and nominal wealth assures that \( \varepsilon(d, p) \) is much larger than \( \varepsilon(d, W_h) \). The positive sign of the numerator requires that the last two terms in \( \bar{\varepsilon}(d, y) \) dominate the elasticity. We constrain \( \bar{\varepsilon}(d, y) \) to positive values.

The short-run response of the flow equilibrium to changes in \( B, S \) and \( g \) depends on the slope of the \( d + g \) curve, \( \varepsilon(p, y|d + g) \), the slope of the price setting function, \( \varepsilon(p, y|s) > 0 \), and on the shift in \( d + g \) resulting from the policy change. Expansive policies shift the \( d + g \) curve of figure 1 upward, and contractive policies shift the curve downward. The vertical shift of \( d + g \) induced by a change in the base, government expenditure or debt is shown in equations (9); signs of components are shown below the components,

\[ \varepsilon(p, g|d + g) = \frac{-1}{\bar{\varepsilon}(d, p)} \frac{\gamma}{1 - \gamma} > 0, \quad (9a) \]
\[ \varepsilon(p, B|d + g) = -\frac{\bar{\varepsilon}(d, B)}{\bar{\varepsilon}(d, p)} > 0, \quad (9b) \]
with
\[ \bar{e}(d, B) = \bar{e}(d, i)e(i, B|AM) + \bar{e}(d, P)e(P, B|AM) + \bar{e}(d, W_n)(1 + \omega)B \frac{B}{W_n} > 0; \]
\[ \bar{e}(d, P)e(P, S|AM) + \bar{e}(d, W_n) > 0; \]
\[ e(p, S|d + g) = -\frac{\bar{e}(d, S)}{\bar{e}(d, p)} > 0, \] (9c)

with
\[ \bar{e}(d, S) = \bar{e}(d, i)e(i, S|AM) + \bar{e}(d, P)(P, S|AM) + \bar{e}(d, W_n) \frac{W_n}{W_n} > 0. \]

The size of the responses of \( d + g \) to \( B, S, \) and \( g \) depends on \( \bar{e}(d, p) \). A large price elasticity of expenditure lowers the response to fiscal and monetary changes. The response to government expenditure increases as the relative size of government, \( \gamma \), increases. The response to a change in the base is larger than the response to a change in \( S \), and both are positive. The stability of the system requires that \( \bar{e}(d, S) \) be positive, so \( \bar{e}(d, i)e(i, S|AM) \) must be smaller than other terms of \( \bar{e}(d, S) \).³

The elasticities in equation (9) describe the change in expenditure induced by changing \( B, S \) or \( g \), holding output constant. They are the vertical shifts of the \( d + g \) line in figure 1. The short-run flow equilibrium depends on these responses and on the slopes of the expenditure and price-setting functions. Equation (10) shows the short-run responses of prices and output to a change in \( g \) allowing as before the interaction with the asset market. The denominator contains the slopes of the expenditure and price-setting functions, expressed as elasticities. Similar responses for \( B \) and \( S \) can be obtained by substituting \( e(p, B|d + g) \) or \( e(p, S|d + g) \) in the numerator of equations (10),
\[ e(p, g|O, AM) = \frac{-e(p, g|d + g)/e(p, y|d + g)}{-1/e(p, y|d + g) + 1/e(p, y|s)} \]
\[ = \frac{-e(p, g|d + g)e(p, y|s)}{e(p, y|d + g) - e(p, y|s)} > 0, \] (10a)

³Our hypothesis also contains the restriction \( e(P, B) > 0 \). This requires the money market response to dominate the response of \( P \) and the credit market response to dominate the response of \( i \). See footnote 1 and the accompanying text.
Monetary and fiscal policies also change the budget position. The budget position depends on price and output and, therefore on \( g, B \) and \( S \). With given tax rates and government purchases of goods and labor services, the outstanding stocks of financial assets, \( B \) and \( S \), increase or decrease until output and prices reach a level at which the budget is balanced.

Equation (8) above defines budget balance in terms of \( p, y, B \) and \( S \). The slope of the budget equation in figure 1 depends on fiscal policies, particularly the decision to use \( g \) (rather than \( pg \)) as a policy variable and on the progressivity of taxes. We use \( \epsilon(p, y|b_{be}; g) \) to denote the slope of the line obtained on the assumption that \( g \) (rather than \( pg \)) is held constant,

\[
\epsilon(p, y|b_{be}; g) = \frac{\epsilon(t, y) - \epsilon(I, i)\epsilon(i, y|AM) IS/t}{(pg/t) - \epsilon(t, p) + \epsilon(I, i)\epsilon(i, p|AM) IS/t} < 0. 
\]

Proportional tax rates are assumed throughout.

The position of the \( b_{be} \) line also depends on fiscal and monetary policy. The elasticities in equation (12) show the shift in the position of the line for changes in \( g, lg, B \) or \( S \). The response to a change in \( w \) (not shown) is identical to the response to \( lg \). Increases in \( g, lg, w \) and \( S \) raise the \( b_{be} \) line and increase the deficit or reduce the budget surplus; increases in the base reduce the deficit or increase the surplus,

\[
\epsilon(p, g|b_{be}; g) = \frac{-pg/t}{\Delta b_{be}; g} > 0, 
\]

\[
\epsilon(p, lg|b_{be}; g) = \frac{\epsilon(t, wlg) - wlg/t}{\Delta b_{be}; g} > 0, 
\]

\[
\epsilon(p, B|b_{be}; g) = \frac{-\epsilon(I, i)\epsilon(i, B|AM) IS/t}{\Delta b_{be}; g} < 0, 
\]

*If the government pays competitive wage rates, the government’s wage bill rises with money wages during periods of economic expansion, and falls if money wages fall during recession. With a constant level (lg) of employment in the government sector, the government’s wage bill has a pro-cyclical effect on the budget even if the private sector maintains constant money wages per efficiency unit. If money wages are slow to decline in recession, wage changes have an inflationary bias even if unit labor costs in the private sector remain constant.*
The elasticities in equation (12) determine the direction in which prices change to reach stock equilibrium. Open market purchases reduce, and open market sales raise, the price level at the new stock equilibrium. Expansive fiscal policies induce a larger increase in the price level at which the economy reaches stock equilibrium if budget deficits are financed primarily by issuing debt or if budget surpluses are used to retire base money. Since the position of the bbe line divides the plane into deficits and surpluses, the financing of deficits and surpluses influences the size of subsequent deficits or surpluses and, given both stock and flow adjustments induced by changes in $B$ and $S$, affects the speed of adjustment to a new stock-flow equilibrium.\footnote{With proportional tax rates, constant population and a fixed capital stock, the long-run position depends on the ratio of $S$ to $B$. The long-run flow equilibrium, $y_0$, can be solved for $B/P$ and $i$ in terms of $S/B$ and the fiscal variables. The budget constraint is then}

\[ \frac{p}{B} \left(g + \frac{1}{B} \left( \frac{S}{B}, y_0, \ldots \right) \right) = t(p, y_0) \frac{1}{B}. \]

With a linear, homogenous tax revenue function,

\[ t(p, y; \tau) \left( \frac{1}{B} \right) = \left( \frac{p}{B}, y; \tau \right). \]

The budget equation determines the ratio of $S$ to $B$ and, for given fiscal policy, is independent of the levels of $S$ and $B$.\footnote{With proportional tax rates, constant population and a fixed capital stock, the long-run position depends on the ratio of $S$ to $B$. The long-run flow equilibrium, $y_0$, can be solved for $B/P$ and $i$ in terms of $S/B$ and the fiscal variables. The budget constraint is then}
balance and flow equilibrium—assure that asset stocks are constant and willingly held at prevailing prices.

To prove that the economy reaches intermediate-run equilibrium, we substitute in the budget equation until the equation contains only variables taken as predetermined in reaching flow equilibrium. The price level, \( p \), is replaced by the price-setting function, equation (1e). Then all values of \( i \) and \( y \) are replaced by their flow equilibrium solutions. The solutions depend on \( B, S, g, wlg, \tau \) and, of course, on \( K \) and \( w \), so the revised budget equation can be written as

\[
\bar{B} + \bar{S} = F(B, S; g, wlg, \tau).
\]

In a closed economy, the stocks of \( B \) and \( S \) tell the history of past budgets and open market operations. Let \( D \) be the cumulated deficit and \( \mu \) the (average) share of the deficit or surplus financed by issuing or withdrawing base money. \( B_0 \) and \( S_0 \) are the nominal stocks of \( B \) and \( S \) that were produced independently of deficit finance, for example the result of open market operations with a balanced budget,

\[
B = B_0 + \mu D \quad \text{and} \quad S = S_0 + (1 - \mu)D, \quad 0 \leq \mu \leq 1.
\]

After replacement of \( B \) and \( S \) by the values in (14), equation (13) relates the current deficit, \( \bar{D} \), to the cumulated deficit, \( D \), to \( \mu \) and to the fiscal policy variables. The budget converges to an intermediate-run equilibrium if the budget deficit or surplus reaches zero at the flow equilibrium values of \( p \) and \( y \). Convergence is assured if \( \partial F/\partial D \) is negative for any admissible value of \( \mu \),

\[
\frac{\partial F}{\partial D} = \mu \frac{\partial F}{\partial B} + (1 - \mu) \frac{\partial F}{\partial S} \leq 0,
\]

where

\[
\frac{\partial F}{\partial B} = pg \left( \varepsilon(y, B|O, AM) \left[ \varepsilon(p, y|s) \left\{ 1 - \varepsilon(t, p) \frac{t}{pg} \right\} - \varepsilon(t, y) \frac{t}{pg} \right] \right.
\]

\[
+ \varepsilon(I, i) \varepsilon(i, B|O, AM) \frac{IS}{pg} \bigg) < 0,
\]

and

\[
\frac{\partial F}{\partial S} = pg \left( \varepsilon(y, S|O, AM) \left[ \varepsilon(p, y|s) \left\{ 1 - \varepsilon(t, p) \frac{t}{pg} \right\} - \varepsilon(t, y) \frac{t}{pg} \right] \right.
\]

\[
+ \varepsilon(I, i) \varepsilon(i, S|O, AM) + 1 \frac{IS}{pg} \bigg).
\]

The elasticities denoted \( O, AM \) are short-run flow equilibrium responses.
similar to the elasticities in equation (10). The negative sign of \( \frac{\partial F}{\partial B} \) follows from: (1) the positive value of \( \epsilon(y, B|O, AM) \), (2) proportional taxes, and (3) the relatively small negative values of the interest payments effect in the last term. A negative value of \( \frac{\partial F}{\partial S} \), however, is less certain. With \( \epsilon(y, S|O, AM) \) positive, the first term is negative but much smaller than the corresponding term in \( \frac{\partial F}{\partial B} \). The interest payments effect is positive and (numerically) larger than the corresponding term in \( \frac{\partial F}{\partial B} \). However, the weight on the first component, \( t|pg \), is much larger than \( IS|pg \), so \( \frac{\partial F}{\partial S} \) is rather small, and \( \frac{\partial F}{\partial D} \) is negative for all values of \( \mu \).\(^9\) The system converges to intermediate-run equilibrium.

Equations (13) and (15) permit the response of the financial stocks to fiscal policy variables to be expressed as derivatives or elasticities of the \( F \)-function. The elasticity of \( D \) with respect to \( g \) is

\[
\epsilon(D, g) = -\frac{\epsilon(F, g)}{\epsilon(F, D)} > 0,
\]

where

\[
\epsilon(F, g) = \frac{pg}{F} \left[ 1 + \epsilon(y, g|O, AM) \left\{ \epsilon(p, y|s) \left[ 1 - \epsilon(t, p) \frac{t}{pg} \right] - \epsilon(t, y) \frac{1}{pg} \right\} + \epsilon(I, i) \epsilon(i, g|O, AM) \frac{IS}{pg} \right],
\]

and the denominator is the elasticity corresponding to \( \frac{\partial F}{\partial D} \) in equation (15). Similarly, we obtain the response of the cumulated deficit and the stocks of financial assets to \( wig \) and to \( \tau \).

Our analysis implies that fiscal policy has a powerful influence on the equilibrium position the economy reaches in the intermediate run. This influence differs from the influence of fiscal variables in Keynesian analysis or in the familiar \( IS-LM \) model. There, changes in government expenditure and tax rates affect mainly flow variables via "the multiplier" mechanism. Our analysis implies that the dominant effect of fiscal policy is on the stock equilibrium position and is transmitted mainly by changes in the stocks of debt and base money. In a closed economy, the behavior of financial stocks is governed by fiscal policy and, to a lesser extent, by open market operations that

\(^9\)The sign of \( \epsilon(y, B|O, AM) \) can be checked by substituting \( \epsilon(p, B|d + g) \) for \( \epsilon(p, g|d + g) \) in equation (10b).

\(^9\)A slight positive value of \( \frac{\partial F}{\partial D} \) would not require any important change in our analysis. Slightly progressive tax rates or a minimum value of \( \mu \) would replace proportional tax rates or an unrestricted value of \( \mu \).
proceed independently of fiscal policy. The stock disequilibrium generated by
time in government or a reduction in tax rates raises
the price level in intermediate-run equilibrium. Money wages are unchanged, so
real wages are lower. Open market sales also raise the price level and reduce
real wages in intermediate-run equilibrium. Open market purchases and
reductions in the relative size of government lower the price level in
intermediate-run equilibrium. With money wages fixed, real wages rise.

The adjustment of money wages occurs slowly in our analysis. With the
passage of time, however, the gradual acceleration or deceleration of money
wages cumulates as a rate of change, dw/w, and the cumulated rate of change
shifts the supply curve of output, raising or lowering prices and changing the
equilibrium position of the output market.

Let e(p, w|s)h(t) denote the shift in the price-setting function induced by a
change in the money wage rate. An increase in money wages raises prices and
reduces output, and a reduction in money wages lowers prices and raises
output. The flow equilibrium moves from the intermediate-run equilibrium in
the direction of y

6

Equation (16) shows the longer-run response of prices and
output to a change in g, e(p, g|O, AM, s) and e(y, g|O, AM, s). Similar expres-
sions for B and S can be written by replacing g with B or S and making
appropriate adjustments on the right-hand side of the elasticities,

\[ e(p, g|O, AM, s) = \frac{-e(p, g|d + g)e(p, y|s) + e(p, y|d + g)e(p, w|s)h(t)}{e(p, y|d + g) - e(p, y|s)} > 0, \]  

\[ e(y, g|O, AM, s) = \frac{-e(p, g|d + g) + e(p, w|s)h(t)}{e(p, y|d + g) - e(p, y|s)}. \]

The adjustment of money wages also affects the stock equilibrium position.
The reason is that the government’s budget equation includes wage payments,
wlg. Changes in money wages change the size of the deficit, per unit of dw/w,
by e(p, w|bbe) = e(p, lq|bbe), shown above as equation (12b). The stock
equilibrium position changes in the same direction as the flow equilibrium but
by a smaller amount. The adjustment of money wages reinforces the effect of
monetary and fiscal policies on prices. If prices were higher in the intermediate-
run equilibrium than at the initial position, prices rise more; if prices fall to
reach the intermediate-run equilibrium, prices fall more to reach the longer-run
equilibrium.
The adjustment of money wages returns the system to the neighborhood of full employment but does not assure the return to full employment at \( y_0 \). The choice of fiscal policies, \( g \), \( I_g \), and \( r \), affects the position of full-employment output, \( y_0 \), by changing the composition of output and by absorbing or releasing labor from the government sector. Moreover, the method of financing deficits or surpluses, and open market operations, change the composition of financial assets and the relative prices of assets and output. For full, long-run, stock-flow equilibrium, we must have \( p = P \). The full response to monetary and fiscal policy involves adjustment of the capital stock if these conditions for full equilibrium are not met. In general, the capital stock must adjust to restore full equilibrium following monetary and fiscal changes.

The sequential adjustment from short-run to longer-run equilibrium is a highly stylized representation of the adjustment process in a closed economy. Actual adjustment is, of course, more of a continuous process and less a sequence of steps than our procedure suggests. The interaction of stocks, flows and the government budget in a closed economy is more clearly revealed, however by the sequential process. Of importance for present purposes is that the framework permits extension to an open economy in which output changes and in which foreigners respond to relative prices by purchasing and selling assets and output on the home country markets.

5. Extension to an Open Economy

The responses obtained for the closed economy form the base for our analysis of interdependent, open economies. Changes modify the descriptions of the markets for credit and output and the definition of non-human wealth. foreigners buy and sell on the home country markets for output and in the credit market; citizens of the home country buy and sell goods and securities in foreign markets for output and assets. The balance of payments constrains the world economy and acts as an additional link between the home country and the rest of the world.

In this section we make adjustments to open the model to trade in goods, services and securities. The description of the "rest of the world" is the same as our description of the home country. Asterisks are used to denote rest of the world variables. Technology and capital stocks are fixed, and population is constant. There is no migration of labor force or population. All countries have proportional tax rates.

Real expenditure now has an additional component, the real value of exports, denoted \( X \). Exports depend on economic activity abroad, on relative prices and on the exchange rate, \( p \). Domestic expenditure, \( d \), depends on the prices at
home and abroad and on the exchange rate. Government expenditure is, as before, set in real terms. The equilibrium condition for the output market is now

\[ y = d + g + X, \]  
\[(17a)\]

\[ d = d(i - \pi, p, P, W_n, W_h, e, pp^*), \quad d_1, d_2 < 0, \quad d_3, \ldots, d_7 > 0, \]  
\[(17b)\]

\[ X = X(i^* - \pi^*, p^*, P^*, W^*_n, W^*_h, e^*, p/p), \]

\[ X_1, X_7 < 0, \quad X_2, \ldots, X_6 > 0. \]

The price-setting function is adjusted to permit substitution of imports for domestic production. The price-setting function becomes

\[ p = p(y, K, w, pp^*), \quad p_1, p_2, p_3, p_4 > 0, \quad p_2 < 0. \]  
\[(17c)\]

Domestic non-human wealth now includes foreign assets owned by domestic residents and excludes liabilities to foreigners,

\[ W_n = PK + \nu(i)(S_S - S_l + \nu^*(i^*)S_t + (1 + \omega)B), \]  
\[(18a)\]

with liabilities to foreigners, \( S_f \), and foreign assets owned by domestic residents, \( S_t \), valued at market prices. The definition is more useful for our analysis if wealth is restated in terms of the net monetary base, \( B_n \). The definition of the net foreign liability position \( B - B_n \), can be obtained from equation (18c). The base includes, and the net base excludes, the net foreign liabilities of the banks and the public,

\[ W_n = PK + \nu(i)(S_S - S_l + \nu^*(i^*)S_t + (1 + \omega)B), \]

\[ B_n = B - \bar{v}(i)S_t + \bar{v}^*(i^*)pS_t = B_0 + \mu D + B_2. \]  
\[(18b)\]

\[ B_2 \] is the stock of base money resulting from surpluses or deficit on current account, the accumulated current account balance, and \( B_0 \) now includes any initial reserve of commodities used as money. Securities are valued in equation (18c) at weighted average values, \( \nu \) and \( \nu^* \), and at market value in equation (18b).\(^{10} \) The last term of equation (18b) measures the contribution of the net foreign position to the net worth of the financial system and is set at zero.

The open economy imposes an additional constraint on asset stocks. The

\(^{10}\) The difference in valuation between (18b) and (18c) arises because wealth is valued at current market prices but international reserves and base money are valued at the time they are received. Initially, wealth and international reserves change by the same amount, the market value of the change in the public's net foreign position. Later, wealth and the market value of securities change with interest rates, and the capital gain or loss is included in wealth. The value of international reserves and the base are not affected by capital gains and losses. The average values \( \bar{v} \) and \( \bar{v}^* \) reflect the convenient assumption that over time changes in the public's net foreign position and changes in international reserves occur at the average market value of securities.
current account balance each period is the sum of the trade balance and interest payments,

$$pX - p^*X^*p^* + i^*v^*(i^*)S^\dagger\rho - iv(i)S_t = \bar{B}_t.$$  \hfill (19)

Devaluation raises the exchange rate, $\rho$. With fixed exchange rates, $\rho$ is constant and the equation proximately determines the balance on current account and the related change in the base, $\bar{B}_t$. The net base, $B_n$, is taken as predetermined relative to the current market process. Net foreign liabilities, $B - B_n$, are determined by relative prices.

The credit market distributes the stock of domestic securities between banks, $S_b$, the domestic non-bank public, $S_p$, and foreigners, $S_f$. The total stock, $S$, depends on the cumulated budget deficit, $D$, as in the closed economy. The distribution of $S$ now depends on the decisions of domestic and foreign residents,

$$S = S_0 + (1 - \mu)D = S_p + S_b + S_f.$$  

In open economies, asset markets are interdependent. The public's supply of earning assets to banks, $\sigma$, now excludes absorption of domestic debt by foreigners, $S_f$, and includes absorption of foreign debt by the domestic market, $S^\dagger$. Changes in relative interest rates induce lenders or borrowers to shift from one country to another. Adjustment of interest rates and the value of net foreign liabilities affects the model in three ways. One, with fixed exchange rates, changes in the net foreign position change the base, $B$, and changes in the base induce changes in the stocks of money and credit. We formalize the effects of relative prices on the net foreign liability position in an equation for the net foreign position,

$$(B - B_n) = b(i - \pi, P, e, i^* - \pi^*, P^*, p^*, e^*, \rho), \quad b_1, b_4, b_6, b_7, b_9 > 0,$$

$$b_2, b_3, b_5, b_8 < 0.$$  

Two, foreign purchases and sales of securities ($S_f$) on the home credit market have the same effect on the supply of earning assets ($\sigma$) as purchases or sales by the domestic public. Increases in domestic rates increase $S_f$ and lower the volume of outstanding securities offered to banks; domestic liabilities to foreigners rise. Increases in rates abroad induce sales by foreigners. $S_f$ declines and the net foreign position is reduced,

$$S_f = \varphi(i^* - \pi^*, i - \pi, P^*, p^*, y^*, \rho), \quad \varphi_1, \varphi_5 < 0, \quad \varphi_2, \varphi_3, \varphi_4, \varphi_6 > 0.$$  

There is a similar equation for $S^\dagger$. Since $S_f$ depends on foreign prices and output, foreign holdings of domestic securities introduce the exchange rate, foreign prices and output into the $\sigma$-function. Three, capital gains and losses and
changes in the net foreign liability position change the value of domestic wealth and, therefore, change spending and money holding.

As before, \( a()B = \sigma \) is the equilibrium condition for the credit market. In an open economy, the credit market distributes the stocks of foreign and domestic securities. Loans by banks can be cancelled on both sides of the equilibrium condition. Domestic securities and the net foreign position remain. The securities are distributed between banks and non-banks by the adjustment of interest rates and prices,

\[
vS_b + v^*S^* = v(S - S_p - S_i) + v^*(S^* - S^*_p).
\]

Domestic and foreign securities are substitutes in the portfolios of wealth owners, but money and real capital are, by hypothesis, owned only by domestic residents. Achieving equilibrium values of domestic and foreign asset prices requires internal adjustment, as in closed economies, and adjustment of interest rates on domestic and foreign markets. The equilibrium conditions for the bank credit and money markets show the interdependence of domestic and foreign asset markets.\(^{11}\)

\[
a(i, P, P, p, W_n, W_b, \epsilon, S - S_i, S^* - S^*_p) = \sigma(i - \pi, P, p, W_n, W_b, \epsilon, S - S_i, S^* - S^*_p), \quad (20a)
\]

\[
a_1 > 0, \quad a_2 > 0, \quad \sigma_1 < 0, \quad \sigma_2 > 0,
\]

\[
m(i, P, P, p, W_n, W_b, \epsilon) = L(i, P, p, W_n, W_b, \epsilon), \quad m_1 > 0, \quad m_2 < 0, \quad (20b)
\]

\[
L_1 > 0, \quad L_2 < 0, \quad L_3 > 0, \quad L_4 > 0.
\]

Other equations of the closed economy model remain as before. Opening the economy to trade and capital movements affects the government budget position and the value of human wealth by changing the prices of assets and output and speeds of response. In the following sections, we develop the interaction of the asset and output markets, the government budget equation and the balance on current account for open economies with fixed exchange rates.

6. Flow Equilibrium in Open Economies with Fixed Exchange Rates

Solutions for the asset and output market equations of the open economy modify the responses of the closed economy. At each step of our stylized procedure, moving from short-run through intermediate- to longer-run solutions.

\(^{11}\)If we disregard the effects of devaluation on wealth, changes in exchange rates affect the money market only through the adjustment of asset prices and interest rates, and \( \rho \) does not enter equation (20b).
tions, the open economy responses differ. The differences depend on the choice of monetary arrangements. In this paper, we consider only economies with fixed exchange rates. This section develops the response of the output market to changes in policy variables. We allow for the interdependence of world markets for assets and output and the effects of interdependence on \( p, y, p^* \) and \( y^* \). In the following section, we discuss the adjustment of asset stocks in the two countries and the simultaneous solutions on the asset and output markets in a world with fixed capital stock.

We begin with the asset markets. There are now four interacting asset market equations that simultaneously determine \( i, i^*, P, P^* \) for given stocks of assets and given economic activity and output prices at home and abroad. As in the closed economy, first, we hold output and output prices constant and determine the set of asset prices and interest rates at which the stocks are willingly held. The stocks of money and bank credit are determined in this process for the given price levels and outputs at home and abroad. The net foreign liability position \( B - B_n \) depends on the relative prices and is determined at the asset market equilibrium. The notation \( A, A^* \) identifies the short-run asset market equilibrium as a world equilibrium.

Next we analyze the response of the output market allowing for the change in the equilibrium position of the asset markets. The initial response of expenditure and output to any policy change does not include the effect of interaction between domestic and foreign output markets. We use \( \varepsilon(y, B_n|OA, A^*) \) to denote the response to the base and similarly for other elasticities. Then, we permit interaction between the output markets and determine the short-run equilibrium position of the open economy, denoted \( OAO^*A^* \). Output responds to price changes as in the short-run equilibrium of the closed economy, and exports and imports respond to relative prices. At the short-run equilibrium position, stocks of financial assets are not fully adjusted to policy (or other) changes and \( K, w, \pi, K^*, w^* \) and \( \pi^* \) are held constant.

The longer-run adjustment of output and prices involves gradual changes in money wages. In an open economy, wage adjustments affect prices and output at home and abroad. The response, obtained from the price-setting functions, include these interactions. In our notation, these responses are \( \tilde{\varepsilon}(p, y|s, s^*) \).

The solution of the asset market equations for a closed economy shows that the relative change in \( i \) is

\[
\frac{di}{i} = - \tilde{\varepsilon}(i, B|AM) \frac{dB}{B} + \tilde{\varepsilon}(i, S|AM) \frac{dS}{S} + \varepsilon(i, y|AM) \frac{dy}{y} + \varepsilon(i, p|AM) \frac{dp}{p}.
\]

A similar equation determines the short-run response of \( P \). The elasticities in the equations for \( i \) and \( P \) are ratios expressing the responses of the excess supply functions of the credit and money markets to changes in the proximate
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Determinants (including any induced response of wealth). With interacting credit and money markets, changes in net liabilities to foreigners modify the response of interest rates and asset prices. The solutions for \( i \) and \( P \) now have the general form of equation (21),

\[
i = i(B_n, S, i^*, P^*, y, y^*, p, p^*).
\]

If \( i^* \) and \( P^* \) are now replaced by the solutions of the equations for the foreign asset market, analogous to equations (20a) and (20b) we can obtain the total response of \( i \) and \( P \) (and of \( i^* \) and \( P^* \)) to changes in the proximate determinants. Some elasticities obtained from equation (21), after replacing \( i^* \) and \( P^* \) by their solutions, are shown in table 1.

The response of \( i \) or \( P \) to \( B_n \) in an open economy is a weighted average of the closed economy responses with weights expressing the interaction of the asset markets. Similar responses to \( S, p, \) and \( y \) are shown by \( \epsilon(i, y|A, A^*) \) and \( \epsilon(P, y|A, A^*) \). \( P \) and \( i \) also depend on \( B_n^*, S^*, y^* \) and \( p^* \) in an open economy; \( \epsilon(i, B_n^*|A, A^*) \) shows a typical elasticity.

The size of the elasticities in table 1 depends on the relative size of the home country. For a relatively small or a relatively large country, the response to \( B_n, S, y \) and \( p \) are approximately the same in an open economy as in the corresponding closed economy. The reason is that \( a_{11}, a_{22} \) and the denominator approach unity for both large and small countries, and \( a_{12} \) and \( a_{21} \) approach zero. The reasons differ. In large countries, the effect of foreign asset prices on domestic prices is relatively small; all elasticities of \( i \) and \( P \) with respect to \( i^* \)

<table>
<thead>
<tr>
<th>Table 1</th>
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\[
\begin{align*}
\epsilon(i, B|A, A^*) &= \frac{\epsilon(i, B|AM) a_{22} + \epsilon(P, B|AM) a_{12}}{a_{11} a_{22} - a_{12} a_{21}} < 0 \\
\epsilon(P, B|A, A^*) &= \frac{\epsilon(P, B|AM) a_{11} + \epsilon(i, B|AM) a_{12}}{a_{11} a_{22} - a_{12} a_{21}} > 0 \\
1 > a_{11} &= 1 - \epsilon(i, i^*|AM) \epsilon(i^*, i|AM^*) - \epsilon(i, P^*|AM) \epsilon(P^*, i|AM^*) > 0 \\
a_{22} &= 1 - \epsilon(i, i^*|AM) \epsilon(i^*, P|AM^*) + \epsilon(i, P^*|AM) \epsilon(P^*, P|AM^*) < 0 \\
1 > a_{22} &= 1 - \epsilon(P, P^*|AM) \epsilon(P^*, P|AM^*) - \epsilon(P, i^*|AM) \epsilon(i^*, P|AM^*) > 0 \\
\epsilon(i, y|A, A^*) &= \frac{\epsilon(i, y|AM) a_{22} + \epsilon(P, y|AM) a_{12}}{a_{11} a_{22} - a_{12} a_{21}} > 0 \\
\epsilon(P, y|A, A^*) &= \frac{\epsilon(P, y|AM) a_{11} + \epsilon(i, y|AM) a_{12}}{a_{11} a_{22} - a_{12} a_{21}} > 0 \\
\epsilon(i, B_n^*|A, A^*) &= \frac{\epsilon(i, i^*|B_n^*|AM^*) + \epsilon(i, P^*|B_n^*|AM^*) a_{12}}{a_{11} a_{22} - a_{12} a_{21}} < 0 \\
\end{align*}
\]
and $P^*$ approach zero. In a small country, the responses of $i^*$ and $P^*$ to $i$ and $P$ are small. Since home country and foreign responses always appear as a product, the product approaches zero whenever there is substantial difference in relative size.

Interdependence of the asset markets is most important if countries or currency areas are of approximately equal size. In small countries, the effect of interdependence can be approximated by the response to foreign variables. As shown by $\epsilon(i, B^*, A, A^*)$, the influence of foreign variables does not vanish. In a large country, all influences from abroad are of small order of magnitude and can be neglected. The responses on the asset markets of a large open economy can be approximated by the elasticities obtained from the model of a closed economy.

Opening the economy to trade and capital movements modifies our analysis of the output market in four ways. First, output and prices become subject to influences from both domestic and foreign asset markets. The elasticities denoted $A, A^*$ replace the $AM$ elasticities. Second, the dependence of $d$ on $p^*$ and the inclusion of exports in expenditure provide channels for interaction between foreign and domestic expenditure. These interactions modify the slope of the expenditure function and the response of real expenditure to changes in $B, S,$ and $g$. Third, the price setting function now includes $p^*$. Interaction between $p$ and $p^*$ affects output and the slope of the price setting function. Fourth, both output and asset market equations show that changes in $y^*$ affect the home country. Interaction between $y$ and $y^*$ alters the equilibrium positions of the two output markets and the two asset markets through $W_h, e, W_f$ and $e^*$. The partial derivatives of $d$ and $X$ with respect to $y$ and $y^*$ are combinations of the derivatives with respect to $W_h$ and $e$ or $W_f$ and $e^*$.

From equations (17a) and (17b) we obtain the slope of the expenditure function in the $p, y$ plane—the counterpart of $\epsilon(p, y|d + g)$ for the closed economy—and the shifts induced by changes in $g, B$ and $S$. The responses recognize interaction on the asset markets and the response of the price level to asset prices holding output constant and neglecting interaction between $y, p, y^*$ and $p^*$. The slope is denoted $\epsilon(p, y|d + X + g)$ and the shifts in position are now $\epsilon(p, g|d + X + g), \epsilon(p, B|d + X + g)$, etc. These elasticities are defined for given values of $g, B, S, B^*, S^*$, and $y^*$. Table 2 shows typical responses to domestic and foreign variables.

Opening the economy to exchanges of goods and securities lowers the slope of the expenditure function in small and large economies, but the change in slope is relatively small. The total price elasticity of domestic expenditure, $\bar{\epsilon}(d, p)$ contains $\epsilon(p^*, p)$ and $\epsilon(p, p^*)$. One of the two vanishes in large and small countries. We have shown that the $AA^*$ components differ little from the $AM$ components so that $\bar{\epsilon}(d, y)$ and $\bar{\epsilon}(d, p)$ in table 2 are similar to the
TABLE 2

\[
\begin{align*}
\epsilon(p, y|d + X + g) &= \frac{1 - (1 - \beta - \gamma)\bar{\epsilon}(d, y) + \beta\bar{\epsilon}(X, y)}{(1 - \beta - \gamma)\bar{\epsilon}(d, p) + \beta\bar{\epsilon}(X, p)} < 0 \\
\epsilon(p, g|d + X + g) &= -\frac{\gamma}{\Delta OM} > 0 \\
\epsilon(p, B_o|d + X + g) &= -\frac{((1 - \beta - \gamma)\bar{\epsilon}(d, B_o) + \beta\bar{\epsilon}(X, B_o))}{\Delta OM} > 0 \\
\epsilon(p, B_2^*|d + X + g) &= -\frac{((1 - \beta - \gamma)\bar{\epsilon}(d, B_2^*) + \beta\bar{\epsilon}(X, B_2^*))}{\Delta OM} > 0
\end{align*}
\]

with \( \beta = X/y, \gamma = g/y, \) and \( \Delta OM = \) the denominator of \( \epsilon(p, y|d + X + g). \)

Typical components and signs are

\[
\begin{align*}
\bar{\epsilon}(d, y) &= \epsilon(d, y) + \bar{\epsilon}(d, i)e(i, y|\hat{A}, A^*) + \bar{\epsilon}(d, p)e(P, y|\hat{A}, A^*) > 0 \\
\bar{\epsilon}(X, y) &= \epsilon(X, y) + \bar{\epsilon}(X, i^*)e(i^*, y|\hat{A}, A^*) + \bar{\epsilon}(X, p^*)e(P^*, y|\hat{A}, A^*) - 0 \\
\bar{\epsilon}(d, p) &= \epsilon(d, p) + \bar{\epsilon}(d, i)e(i, p|\hat{A}, A^*) + \bar{\epsilon}(d, p)e(P, p|\hat{A}, A^*) + \\
\epsilon(p, p^*) &= \epsilon(p, p^*) + \epsilon(p, p^*)e(i, p^*|\hat{A}, A^*) + \epsilon(d, p^*)e(P, p^*|\hat{A}, A^*) + \epsilon(p, p^*) \]
\]

\[
\begin{align*}
\bar{\epsilon}(d, B_o) &= \bar{\epsilon}(d, i)e(i, B_o|A, A^*) + \bar{\epsilon}(d, p)e(P, B_o|A, A^*) > 0 \\
\bar{\epsilon}(X, B_o) &= \epsilon(X, i^*)e(i^*, B_o|A, A^*) + \epsilon(X, p^*)e(P^*, B_o|A, A^*) > 0 \\
\bar{\epsilon}(d, B_2^*) &= \epsilon(d, i)e(i, B_2^*|A, A^*) + \epsilon(d, p)e(P, B_2^*|A, A^*) > 0
\end{align*}
\]

corresponding elasticities in a small or large closed economy.

The slope of the open economy expenditure function in table 2 differs in two main ways from the slope in a closed economy. One is the presence of \( \epsilon(X, p), \) the partial price elasticity of exports. The other is \( \beta, \) the ratio of exports to domestic output. Differences in the response of open and closed economies are reduced by the relatively small size of \( \beta \) in large economies and increased by the relatively large value of \( \beta \) in small countries.

The conclusion about the slope \( \epsilon(p, y|d + X + g) \) carries over to the responses to policy variables. For large economies, the responses to policy variables shown in table 2 differ little from the closed economy responses. For small countries, the effects of \( B_2^*, y^*, p^* \) and possibly \( S^* \) cannot be neglected.

The supply response of the open economy can be obtained directly from equation (17c). We recognize the interdependence of \( p^*, p, y^*, \) and \( y \) by rewriting the equation as

\[
p = p[y, K, w, pp^*(y^*, K^*, w^*, p/p)].
\]

The slope of the supply curve in the \( p-y \) plane, neglecting interaction between
y and \( y^* \) (as in the elasticities of the expenditure function), is\(^{12}\)

\[
\hat{\varepsilon}(p, y|s) = \frac{\varepsilon(p, y|s)}{1 - \varepsilon(p^*, p)\varepsilon(p, p^*)}.
\]

Opening the economy to trade increases the slope of the supply function. The change is small, however, in small or large countries. In these cases, either \( \varepsilon(p, p^*) \) or \( \varepsilon(p^*, p) \) vanishes. For a country approximately the same size as its trading partners, the interaction between domestic and foreign prices cannot be neglected.

The short-run response of output and prices in the home country to changes in \( g, B_n, S, B^*_n, S^* \), or \( y^* \) is completely determined by the slopes and shifts. The response abroad is the mirror image of the home country response. For each country, we have determined a position of short-run flow equilibrium that is an exact analogue of the short-run flow equilibrium of the closed economy shown in figure 1 and equation (10). All variables held constant when determining the slopes of the expenditure and price-setting functions are treated similarly, and the response in the rest of the world is again a mirror image of the home country response.

Our analysis of the interaction of the flow markets with fixed money wages and fixed capital stock requires one additional step. The responses just described are obtained holding \( y^* \) constant at home and \( y \) constant abroad. Changes in \( y \) and \( y^* \) and their interaction affect the position of flow equilibrium in two ways, by changing the equilibrium values of \( P, i, P^* \) and \( i^* \) determined on the four-asset markets and by the interaction of the output market variables. To avoid additional, cumbersome notation, we rewrite the flow equilibrium condition for the home country and the rest of the world in terms of the existing stocks and the variables \( y \) and \( y^* \),

\[
y = d(B_n, B^*_n, S, S^*, y, y^*) + X(B_n, B^*_n, S, S^*, y, y^*) + g, \tag{22a}
\]

and

\[
y^* = d^*(\quad) + X^*(\quad) + g^*. \tag{22b}
\]

The two equations express the full effect on expenditure of the interaction of asset markets and output markets in the two countries. The effects on \( d, X, d^* \), and \( X^* \) of \( i, P, i^* \) and \( P^* \) are now implicit in the elasticities with respect to the variables in equations (22). Table 3 shows some principal responses obtained-

\(^{12}\)An additional effect occurs if domestic money wages depend on foreign prices or on foreign wages. We neglect any direct effect of this kind. Below, we recognize an effect on wages from excess supply or demand as in the closed economy.
Table 3

\[ \varepsilon(y, B_n|OA, A*) = \frac{(1 - \beta - \gamma)e(d, B_n) + \beta e(X, B_n)}{1 - (1 - \beta - \gamma)e(d, y) - \beta e(X, y)} > 0 \]

\[ \varepsilon(y, B_n|OAO*|A*) = \frac{(1 - \beta - \gamma)[e(d, B_n) + e(d, y*)e(y*, B_n)] + \beta [e(X, B_n) + e(X, y*)e(y*, B_n)]}{1 - (1 - \beta - \gamma)[e(d, y) + e(d, y*)e(y*, y)] - \beta [e(X, y) + e(X, y*)e(y*, y)]} > 0 \]

\[ \varepsilon(y, g|OAO*|A*) = \frac{\gamma}{\delta} > 0 \]

\[ \varepsilon(y, g^*|OAO*|A*) = \frac{\gamma^*[(1 - \beta - \gamma)e(d, y*) + \beta e(X, y*)]}{\delta} > 0 \]

\[ \varepsilon(y, B^*_n|OAO*|A*) = \frac{(1 - \beta - \gamma)[e(d, B^*_n) + e(d, y*)e(y*, B^*_n)] + \beta [e(X, B^*_n) + e(X, y*)e(y*, B^*_n)]}{\delta} > 0 \]

from the two equations. The responses in the rest of the world are, again, mirror images of the home country responses.

The first elasticity in table 3, \( \varepsilon(y, B_n|OA, A*) \), is obtained from equation (22a) ignoring interaction with the output markets in the rest of the world, equation (22b). The components of \( \varepsilon(y, B_n|OA, A*) \) are described more fully in table 2 where the numerator appears as the numerator of \( \varepsilon(p, B_n|d + X + g) \), and the denominator is the numerator of \( \varepsilon(p, y|d + X + g) \).

The full response of output to a change in the base and other policy variables includes the interaction with output markets abroad, equation (22b). All remaining elasticities in table 3 recognize the interaction and are denoted \( OAO*|A* \). The pattern is recognizable. The two terms in the numerator of \( \varepsilon(y, B_n|OAO*|A*) \) contain the total response of domestic expenditure and exports to \( B_n \) on the output and asset market. Each has two components. The first, \( e(d, B_n) \) and \( e(X, B_n) \) are the same terms appearing in the numerator of \( \varepsilon(y, B_n|OA, A*) \). The second component of each term allows for a response of \( y^* \) to \( B_n \), taking account of the full interaction of the markets for assets and output. The denominator contains \( e(d, y) \) and \( e(X, y) \) from table 2, modified by the interaction of the asset and output markets expressed by \( e(d, y*) \) and \( e(X, y*) \). If the export response is the larger of the two, interaction lowers the denominator. The numerator increases, so allowing for interaction raises the response. The responses to \( S \) and \( S^* \) are obtained by substituting \( S \) and \( S^* \) for \( B \) and \( B^* \).

As before, the values of the elasticities depend on the relative size of the two markets. For small countries \( \varepsilon(y^*, y) \) is small, and for large countries, \( \varepsilon(d, y^*) \) and \( \varepsilon(X, y^*) \) are small. The total response over output and asset markets at home and abroad differs little from the domestic response. For a large country the effects of \( g^* \), \( B^*_n \) and \( S^* \) are small also, so the closed economy results remain valid. For a small country, the closed economy results are approximate.
measures of the effect of $B_n$, $g$, and $S$, but output in the open economy depends heavily on $B^*_n$, $g^*$ and $S^*$.

Determining the longer-run equilibrium price response requires one additional step. Each response of $y$ is multiplied by the response of $p$ to $y$ obtained from the price-setting function allowing for the full interaction of domestic and foreign markets. The adjustment of $p$ induced by changes in $B_n$, $B^*_n$, $S$ or other variables in table 3 is the product of the response of real output to the particular variable shown in table 3 multiplied by $\bar{e}(p, y|s, s^*)$.

$$
\bar{e}(p, y|s, s^*) = \varepsilon(p, y|s) + \varepsilon(p, p^*)[(\varepsilon(p^*, y^*)\varepsilon(y^*, y) + \varepsilon(p, w)h(t)]/(1 - \varepsilon(p, p^*)\varepsilon(p^*, p)) > 0.
$$

(23)

The term $\varepsilon(p, w)h(t)$ shows that elasticity includes the longer-run adjustment of money wages implicit in equation (5).

The response of prices in a small or large open economy is similar to the response in a closed economy. Again, the symmetry of the results for large and small countries depends on different terms that appear multiplicatively. And again, the terms expressing the interaction of the home country with the rest of the world increase the slope of the price-setting function in countries of moderate size.\(^{13}\)

### 7. Stock-flow Equilibrium with Fixed Exchange Rates

The longer-run flow equilibrium position in each country depends on the stocks of debt and base money outstanding at home and abroad. The extent of dependence on foreign stocks varies with the relative size of the country and is largest for countries approximately equal in size to their trading partners. With fixed exchange rates, no country is entirely isolated from foreign influence, but a relatively large country with a relatively small foreign sector experiences relatively little short-run feedback from its own policies and is not much affected by the policies of foreign governments. A relatively small country also receives very little feedback from its policies but is affected much more by

\(^{13}\)Since capital stocks remain fixed throughout this analysis, the longer-run equilibrium position generally is not a full equilibrium. For full equilibrium the relative prices of assets and output must adjust until $p = P$. In open as in closed economies, full adjustment generally requires changes in the composition of output and changes in the capital stock.
influence from abroad. The determination of equilibrium stocks and flows differs with the size of the country.

The stocks of base money and debt in each open economy are a consequence of current and past domestic and international monetary and fiscal policies. In this section, we discuss mainly the longer-run stock-flow equilibrium position, the determination of the stocks of assets consistent with the longer-run flow equilibrium of the previous section.

Determination of equilibrium stocks of financial assets—\( B, B^*, S \) and \( S^* \)—involves three equations introduced earlier, the government budget equations for the two countries and the common current account balance. Table 3 and equation (23) show that the longer-run equilibrium values of \( p, y \) and \( i \) depend on financial asset stocks and policy variables. By substituting the solutions for \( i, p, \) and \( y \) in the budget equations of each country, we can express the current budget deficit or surplus as a function of outstanding asset stocks and policy variables. The resulting equations, equations (24a) and (24b), are the analogues in an open economy of equation (13) of the closed economy. \( F \) and \( F^* \) determine the deficit or surplus in the budget of the home country and the consolidated budget of the rest of the world.

Equation (24c) is obtained in a similar way. All flow variables in the current account balance, equation (19), are replaced by their solution in terms of financial asset stocks and policy variables. The stocks of domestic assets are combined as \( D \) and \( D^* \); the cumulated current account balance is \( B_2 \).

\[
\begin{align*}
\hat{D} & = F(D, D^*, B_2; g, g^*, w, lw, l^*, r, r^*, \mu, \mu^*, \rho), \quad (24a) \\
\hat{D}^* & = F^*(D, D^*, B_2; g, g^*, w, lw, l^*, r, r^*, \mu, \mu^*, \rho), \quad (24b) \\
\hat{B}_2 & = C(D, D^*, B_2; g, g^*, w, lw, l^*, r, r^*, \mu, \mu^*, \rho). \quad (24c)
\end{align*}
\]

The signs above the variables show the direction of change in \( \hat{D}, \hat{D}^* \) and \( \hat{B}_2 \) for positive changes in the stocks and policy variables. As in the closed economy [equation (15)] the response of \( F \) to \( D \) may require some restriction on the size of \( \partial F/\partial D \). The same is true of \( \partial F/\partial D^* \) because of the presence of \( \partial F/\partial S^* \), but to a lesser degree because \( \partial F/\partial S^* \) is small. A small minimum value of \( \mu \) may be required for a negative derivative in open as in closed economies. Similar comments apply to the \( F^* \) equation, and to a minimum \( \mu^* \), by the symmetry built into our solution. The signs of \( C \) require some restrictions on the response of exports and imports to domestic and foreign prices. These are the usual restrictions on the size of direct responses relative to feedback from abroad.
8. The Scope for Independent Policies in Interdependent Economies

Inspection of the dynamic system, equations (24a) to (24c), shows that the adjustments of the two economies are determined by fiscal variables—\( g, g^*, \tau, \tau^*, \omega g, \omega g^* \)—and by monetary policy expressed by the financial parameters \( \mu \) and \( \mu^* \) and by exchange rate arrangements. Some questions about the properties of the system arise. How many independent policy choices can be made without endangering the stability of the system? Can all countries maintain independent fiscal policies and fixed exchange rates? What is the required policy in countries that seek to harmonize fiscal and monetary policies? This section attempts to answer these questions by examining the stability of the system and the conditions for stability. A diagram summarizes the discussion.

In principle, every policy change affects the net foreign positions, the balances on current account and the budget positions of the rest of the world, but our analysis has shown that the size of any effects on the rest of the world and from the rest of the world depends on the size of the country. Small countries have little influence on large countries but are greatly influenced by the policies of large countries.

The stability of the fixed exchange rate system depends on the properties of the differential equation describing the adjustment of financial assets in the interdependent world economy. If the differential equation has only negative real roots, the fixed exchange rate system is stable. The homogenous differential equation formed from equations (24a) to (24c) has the general form:

\[
a_0 \lambda^3 + a_1 \lambda^2 + a_2 \lambda + a_3 = 0.
\]

The Routh-Hurwitz conditions imply that a sufficient condition for instability of the system is \( a_3 < 0 \). The sign of \( a_3 \) can be found from

\[
a_3 = F_D(F_B C_D - F_B C_B) + F_D(F_B C_D - F_B C_B) + C_D(F_B F_B - F_B F_B).
\]

The sign of the first term of \( a_3 \) depends on relative orders of magnitude, but is probably positive. All other terms are negative, so \( a_3 < 0 \) and the fixed exchange rate is unstable under a wide variety of conditions. Moreover, conditions that assure a positive value of the first term, large \( F_B \) and \( C_B \), also raise the absolute value of the other terms.

The coefficient \( a_0 > 0 \). All other coefficients are obtained from the matrix of partial derivatives used to form the characteristic equation

\[
\begin{vmatrix}
\lambda - F_D & -F_B & -F_B \\
-F_B & \lambda - F_B & -F_B \\
-C_D & -C_B & \lambda - C_B
\end{vmatrix} = 0.
\]
Instability of the system means that once the world economy leaves an equilibrium position, there is no mechanism that restores equilibrium at the fixed rates. One reason is that governments engage in independent policy operations. Financial assets are created and destroyed to finance budget policies and the balance of payments. The world stock of money changes with $\mu D$, $\mu^* D^*$ and $B_2$. There is no mechanism assuring that the rates of change of money and the stocks of financial assets remain consistent with prevailing exchange rates once the analysis incorporates independent budget processes.

Suppose a country disturbs equilibrium by expansive fiscal policy, increasing $G$, keeping tax rates and financial policy ($\mu$) unchanged. The budget deficit rises ($\hat{B} > 0$) and the outstanding stock of financial assets, $D$, increases. Prices rise in the expanding country and in the rest of the world. There is a deficit on current account ($\hat{B}_2 < 0$) and a budget surplus in the rest of the world ($\hat{D}^* < 0$), shown in equations (24b) and (24c) by the responses to $g$ and $D$. The budget surplus abroad reduces $D^*$, reducing the stocks of foreign financial assets and slowing the rate of increase of money and securities in the world. The reduction of $B_2$ works to equilibrate prices in the expanding country and the rest of the world. The familiar price-specie flow mechanism decelerates prices in the expanding country and accelerates prices in the rest of the world. In addition, the changes induced by the movements of international reserves raise the budget deficit in the expanding country and the budget surplus in the rest of the world. These responses are shown by the effects of $B_2$ on $\hat{D}$ and $\hat{D}^*$ in equations (24a) and (24b). The rate of increase in assets slows if fiscal policy and financial policy remain unchanged.

The damping of the response to a change in $g$ (or other expansive policy action) depends not only on the price-specie flow mechanism but on the budget policy mechanism. The rest of the world must absorb some of the assets created to finance the home country budget and must run a budget surplus to reduce their outstanding stocks of base money and securities.

If foreigners choose to maintain fixed exchange rates, they cannot select an independent fiscal policy. Every choice of $g^*$ and $\tau^*$ imposes restrictions on the policy choices available to the home country.

Maintenance of equilibrium with fixed exchange rates imposes restrictions on fiscal and financial policies. For a time, a country can offset some of the effect on prices, output and asset stocks by changing current (marginal) $\mu^*$ relative to average $\mu^*$. Opportunities of this kind are limited and decline with the length of run. In the longer-run equilibrium at fixed exchange rates persists if and only if wealth owners treat domestic and foreign assets as perfect substitutes at the prevailing exchange rates and commodities sell at equivalent prices.

A diagram brings out some implications of our analysis. In figure 2, equations
(24a) to (24c) are shown as equilibrium relations. Each differential equation is set equal to zero and solved for $D$ as a function of $B_2$. The position of each line depends on $D^*$ and on the policy variables. The $FF$ line defines a balance in the home country budget, $\dot{D} = 0$. The $F*F*$ line defines a balanced budget in the rest of the world, $\dot{D^*} = 0$. The $CC$ line defines a current account balance for both countries, $B_2 = 0$.

The intersection of the three lines is a position of world equilibrium. At all other positions at least one market is not in equilibrium. At values of $B_2$ to the right of $CC$, $FF$ and $F*F*$, $\dot{B}_2$ and $\dot{D}$ are negative and $\dot{D^*}$ is positive. The home country has a deficit on current account and a surplus in the government budget. $B_2$ and $D$ decline, so $B_n$ and $S$ decline. The rest of the world has a surplus on current account, equal to the home country deficit, and a deficit in the budget. Domestic assets of foreign countries increase, and $B^*$ and $S^*$ rise. The point, or area, labelled $I$ has these properties.

The opposite set of circumstances is found at values of $B_2$ to the left of $CC$, $FF$, and $F*F*$. The point labelled $II$ has the properties $\dot{B}_2 > 0$, $\dot{D} > 0$ and $\dot{D^*} < 0$. The home country has a surplus on current account and a deficit in the
government budget; the rest of the world has a deficit on current account and a budget surplus. In the home country, stocks of base money and securities rise; in the rest of the world, assets stocks fall.

From point II, the home country moves toward the CC and FF lines under the impact of rising asset stocks. The movement is in the direction of stock equilibrium for the home country but may be away from the $F^*F^*$ curve. The budget surplus abroad, however, complicates the adjustment. The effect of falling $B_t^*$ and $S^*$ is to raise the FF and $F^*F^*$ lines and lower the CC line. $F^*F^*$ and CC move toward point II and FF moves away.

Whether the total effect is a convergence toward equilibrium stocks or a movement away from equilibrium depends on the choice of policies in the two countries. There are sets of policies that move the system toward equilibrium. However, fixed policies - constant $g, g^*, \mu, \mu^*, \tau, \tau^*$ - are inconsistent with world equilibrium at fixed exchange rates as shown earlier.

An example brings out the problem of holding exchange rates fixed while choosing independent monetary and fiscal policies in open, interdependent economies. Suppose, as before, that the home country increases $g$ thereby putting the world economy inside the triangle formed by the CC, FF and $F^*F^*$ lines of figure 2. At every point in the triangle, $B_t < 0$, $D > 0$ and $D^* < 0$. The home country has a deficit in the current account balance and a budget deficit. The rest of the world has a surplus on current account and a budget surplus. With $B_t < 0$ and $D > 0$, $B_t$ falls and $D$ rises in the home country, moving the world economy toward the intersection of CC and FF. The surplus in the foreign budget, however, lowers CC (shifts CC to the left) and raises FF and $F^*F^*$. The FF and CC lines move away from equilibrium. Instability implies that these movements are large relative to the adjustment toward equilibrium in the home country. Stocks of foreign exchange move toward a minimum, critical level, $B_{2min}$ in figure 2, before the payments imbalance is corrected. At the minimum level of $B_2$, devaluation is a likely solution.

Devaluation is not the only solution. Before reaching the minimum level of $B_2$, a reduction in $g$ or an increase in $\tau$ helps to restore equilibrium. An increase in $g^*$ or a reduction in $\tau^*$ also moves the system toward equilibrium. As we emphasized earlier, there are sets of policies that help to maintain fixed exchange rates, but the system is unstable with independent fiscal policies. If policy changes in a country of moderate or larger size disturb world equilibrium the world economy does not return to the previous equilibrium. The diagram demonstrates the point we have emphasized. In open, interdependent economies with fixed exchange rates, countries cannot maintain independent fiscal and monetary policies.
9. Conclusion

The main policy conclusion reached in our analysis is that the fixed exchange-rate system is likely to be unstable. Departures from stock-flow equilibrium do not set off a process that restores equilibrium. There are too many sources of money and debt creation in open economies to assure that the system returns to equilibrium at unchanged exchange rates. The many devaluations and revaluations under the Bretton-Woods system support this implication.

Our conclusions are derived from a model that differs in several ways from recent analyses [Mundell (1968)]. Output is variable; prices of assets and output change; the conditions of world equilibrium do not hold at every instant but are a consequence of the behavior of economic agents responding to policy and other changes. Countries are not all “small”. They differ in size, and the effects of policy and other changes depend on size.

Decisions of large countries have considerable influence on prices and output in small countries, but the reverse is not true. Large countries bent upon an independent policy course find their influence on world prices and output magnified by the fixed exchange-rate system. Countries approximately equal in size to their trading partners are in an intermediate position. Interdependence increases with the size of a country’s trading partners.

For small and large countries, the effects of domestic policy actions is very similar in open and closed economies. Opening the economy to trade in assets and current output does little to enhance or weaken the effects of monetary and fiscal policies in these countries.

In open and closed economies, fiscal policy has a powerful influence on the stock-flow equilibrium position. The influence comes from the effect of fiscal policy on the outstanding stocks of financial assets, money and bonds. The effect on asset stocks is considerably larger and more durable than the effect of fiscal policy on flows, so much emphasized in the past. Fiscal policy is the major determinant of asset stocks in a closed economy, and the level and composition of assets has a dominant effect on equilibrium prices and output. In an open economy, stocks of financial assets depend on fiscal policy and on the balance of payments.

The dependence of assets stocks on domestic and foreign fiscal policy and on the balance of payments is the primary reason for instability of the system. The Bretton–Woods system did not restrict fiscal policy or establish rules limiting the size of budget deficits or the power of central banks to finance budget deficits. Whenever rates of fiscal and monetary expansion in a particular country remained above or below the rates in the rest of the world, devaluation or revaluation followed. In the absence of restrictions on the use of fiscal policy
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and the financing of budget deficits, there is no reason to expect any future system of fixed exchange rates to be durable or stable.

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