INTERNATIONAL FINANCE DISCUSSION PAPERS

A Two Country Model of Financial Capital Movements
as Stock Adjustments with Emphasis on the Effects
of Central Bank Policy

by

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Discussion Paper No. 24, March 23, 1973

Division of International Finance
Board of Governors of the Federal Reserve System

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I. Introduction

Lance Girton and Dale Henderson

By

of Central Bank Policy

as Stock Adjustments With Emphasis on the Effects

A Two Country Model of Financial Capital Movements
See, for example, Miller and Merton (1970a and 1970b).

Portfolios where the size of wealth holders’ investment directly affects the size of wealth holders’ investment are called the stock-slip component of capital flows. A deviation from the effects of a deviation from the effects of a deviation can be fixed, and the stock-slip effect is 

\[ E(R,0) = \delta E(R,0) + \delta E(R,0) \]

where \( \delta E(R,0) \) is the change in desired holdings when the right-hand-side variables change, and \( \delta E(R,0) \) is a measure of portfolio size. The change in real asset variables, and \( R \) is a vector of other relevant variables, and \( R \) is a vector of interest rates. The change may represent a vector of interest rates, or a vector of other

The stock-slip effect is \( \delta E(R,0) \), and the continuing-flow effect is

\[ E(R,0) = \delta E(R,0) + \delta E(R,0) \]

First, the stock-slip component of capital flows is of interest. The empirical evidence we have collected on capital flows suggests that capital flows are fixed and examine in detail the stock-slip component of capital flows. The assumption of wealth holders, wealth holders are the size of portfolio holdings. In this paper we focus upon the short-run portfolio-balancing process.

The continuing-flow effect is

\[ E(R,0) = \delta E(R,0) + \delta E(R,0) \]

Interest rates and other variables held constant has been called the stock-slip component of capital flows, due to growth in the size of the portfolio with changes in desired asset holdings due to changes in one or more interest rates or other variables with the size of the portfolio held constant.

Additional asset holders become increasingly convinced.
we believe that empirical work based on the theoretical model we consider
interest rates and desired financial asset holdings. For this reason
under the control of the policy authorities, and both the level of
able to specify in detail the relationship between variances directly
exogenous. Another important feature of our model is that we are
Jointly determined with desired asset holdings instead of being taken as
a case from models of the small-country case is that interest rates are
important feature which distinguishes our model of the large-country
structure the world economy. This model is outlined in Chapter II. One
that deals explicitly with two countries which, taken together, can
world economy. In order to accomplish this objective we develop a model
of the portfolio balance approach to economies which look large in the
small open economy. Our objective is to trace out the implications
\[1\] Implications of the portfolio balance formulation for the case of a
much useful effort has been expended in spelling out the
achieve their policy objectives under a regime of fixed exchange rates.
the freedom of policy makers to use the instruments at their command to
majority of stock-adjust shifts changes in desired asset holdings, severely limit
national boundaries, which are probably best viewed as being made up
that rapid movements of large amounts of financial capital across

[1] See, for example, Mundell (1968, Chapter II) and McFadden and

are Miller and Whiteman (1970c) and Koutl and Porter (1972).

determined when the country begins to trade with foreign countries. If the country's interest rates and domestic asset holdings are substantially fixed, interest rates in one country should be regarded as large.

Two recent empirical studies which attempt to take account of the experience of central banks. In Chapter III we investigate an outside reserve regime,

regimes under various assumptions about the policy objectives of the central bank. In the second part of the paper, which examines the implications of two alternative fixed exchange rate systems under which the central bank pursues their policy objectives,

pursuing some other objectives. Also of primary concern are the rules on the supply of the interest rate, and the rates of interest within the central bank, that is, whether or not they are trying to stabilize the central bank.

It is particularly important, we must know the policy objectives of the central bank. Two aspects of central bank behavior are particularly important. What this new equilibrium looks like depends critically upon the behavior of the central bank. Two aspects of central bank behavior are exactly which reserves of central banks, the changes persist until wealth holders respond, the flows of financial capital between countries, and changes in the interest rates. Flows of funds from current account to the economic environment. We shall employ a change in some aspect of the economic environment for the analysis.

In a static short-run portfolio balance model such as the one we shall employ a change in some aspect of the economic environment. On the assumption that interest rates can be taken as exogenous,

most of the existing empirical work on capital flows which is based here would be of more use to policy makers in large countries than
undertaken by the central bank in an open economy in attaining some

Chapter II to isolate some other factors which determine the effec-
tive international reserves available to central banks.

Armed with the results of previous chapters, we attempt in

commercial banking system and in order to consider some of the impi-
tuity of our conclusions to the presence of a fractional reserve

Chapter II we relax this assumption in order to determine the sense-

money is in the form of currency or deposits at the central banks. In

paper there is no commercial banking system, that is, there is no

For purposes of simplicity we assume throughout most of the

holdings are traced out in Chapter II.

deviations for interest rate levels and central bank reserve

portfolios. The implications of the wealth effects consequent upon

assets so that, in general, wealth holders are left with unbalanced

gains and losses arise because of changes in the value of particular

some wealth holders and capital losses for others. These capital

the fact that an exchange rate change results in capital gains for

capital account of the balance of payments. This argument neglects

expected to have little or no impact on desired holdings of financial

It has often been argued that exchange rate changes can be

some crucial aspects of more recent international monetary experience.

what we call the key currency reserve regime which we believe captures
In Chapter VII we draw some general conclusions from our

analysis.

On the effectiveness of monetary policy of the world's wealth holders has a significant if less obvious impact domestic residents and the liabilities of foreigners in the portfolios. In addition, the degree of substitution between the liabilities of relative economic size of the country undertaking the policy action depends in an important and relatively straightforward way on the pay extremely important roles. The effectiveness of monetary policy exchange rate regime, two other features of the economic environment patterns of the two central banks and the prevailing type of fixed the effectiveness of monetary policy depends in part on the behavior of domestic residents. While, as we show in Chapters III through VI, proximate objective, such as lowering the interest rate on liabilities
Financial corporate sector, and consumers. For the "primary" securities (loans) of the government, the non-
financial corporate sector, and financial intermediaries as a whole, our results are applicable to the "secondary"
securities issued by these intermediaries, i.e., mortgage pass-throughs, venture capital funds, and equity
issues. Our results are also applicable to the "primary" securities issued by these intermediaries, i.e.,
the "primary" flows from consumers to producers. Our results are applicable to the "secondary"
securities issued by these intermediaries, i.e., mortgage pass-throughs, venture capital funds, and equity
issues.

Chapter II

We assume initially that there are no private banking sectors in either country. A simple model of the effects of
securities, and U.K. securities. U.K. money, assume that there are only four types of assets: U.K.
Wealth holders in the U.S., and ultimate wealth holders in the bank (UKB), the United Kingdom Central Bank (UKCB), ultimate
analysts the behavior of four groups: the United States central currency is the dollar; the U.K. currency is the pound. We
United States (U.S.) and the United Kingdom (U.K.). The U.S.

II. The Model
Each country's money is held only by its own ultimate wealth holders, but both types of securities, which are identified by the issuer's country of residence, are held in both countries. Money is held in the form of currency or deposits at the central bank. Securities are fixed in nominal value in the currency of the country in which the issuer resides and have variable interest rates.

Ultimate wealth holders in both countries regard the two securities in the model as imperfect substitutes. See Chapter VII.

1/ The model can be adapted easily to allow each central bank to hold the money of the other country as part of its reserves. See

2/ They are like call loans or savings and loan shares. This assumption makes the analysis much more straightforward, but the results would be substantially unaffected if each of the two securities issued by residents of each country were treated as a "single" security issued by residents of each country.

3/ The variety of financial assets which one can imagine being available in a two country world can obviously be arranged into several alternative classification schemes for purposes of analysis. Given the issues we want to consider, we have focused on a given country which is "different" from the "single" security issued by residents of the other country and denominated in that country's currency. The assumptions under which we could regard the bundle of securities issued by residents of a country as a "single" security under a fixed exchange rate system or under flexible exchange rate system in which exchange rates are not "expected" to change. Perhaps most important is the fact that the security denominated in foreign currency can be viewed as having different degrees of "responsibility," so that it is subject to different influences. In addition, actual or potential exchange restrictions may affect investors' views of "international" securities. Also, governments may be viewed as having different degrees of "responsibility," so that securities denominated in foreign currency are not treated as perfect substitutes if the underlying sources of the value of the securities are subject to different influences.
Everywhere in this study except in Chapter V it is assumed that the exchange rate is fixed and that ultimate wealth holders in both countries expect it to remain constant. Inflation rates of both countries are assumed to be zero in both countries, so that there is no divergence between nominal and real interest rates.

We analyze the behavior of central banks and ultimate wealth holders in the "short run". Disturbances to financial asset equilibrium cause instantaneous adjustments in interest rates and in the financial asset holdings of both ultimate wealth holders and central banks, but in our short run prices, incomes, employment levels, and capital stocks remain fixed. We also assume that wealth holders do not take into account their current savings when deciding how to allocate their existing wealth among available assets.

B. The Portfolio Balancing Behavior of Ultimate Wealth Holders

Ultimate wealth holders in the U.S. base their nominal demands for U.S. securities (B), for U.K.

1/ We could carry out our analysis completely in terms of nominal rates of interest if wealth holders anticipated inflation in either period. Since wealth holders balance their portfolios at the beginning of the period, prices, incomes, and capital stocks, and employment during the current period are affected by financial variables. A disturbance to financial asset holdings of both private and public wealth holders at the beginning of the period.

2/ More precisely, our model can be viewed as a period model in which wealth holders balance their portfolios at the beginning of the period. Prices, incomes, capital stocks, and employment in the current period are affected by financial variables. A disturbance to financial asset holdings of both private and public wealth holders at the beginning of the period.
We restrict our attention to this special form of asset demand function:

\[ p = p(M, r, \frac{\alpha}{M}) \]

or

\[ \frac{\partial}{\partial M} \left( p(M, r, \frac{\alpha}{M}) \right) = \left( \frac{\partial}{\partial M} \right) \]

To remain constant, we can substitute into the functional form and write:

\[ \frac{\partial}{\partial M} \left( \frac{p}{M} \right) = \frac{1}{M} \left( p(M, r, \frac{\alpha}{M}) \right) \]

Since prices, outputs, and existing nominal wealth levels are assumed to remain constant, we have:

\[ \frac{\partial}{\partial p} \left( \frac{p}{M} \right) = \frac{1}{M} \left( p(M, r, \frac{\alpha}{M}) \right) \]

where

\[ \left( \frac{\partial}{\partial M} \right) \begin{pmatrix} M \end{pmatrix} = \left( \frac{\partial}{\partial M} \right) \begin{pmatrix} p \end{pmatrix} \]

An example of a quite general asset demand function is the following:

Option asset demand functions are written so as to give demands for nominal wealth. Nominal demands are assumed to be homogeneous of degree one in nominal wealth.

Interest rate on K, securities (r) and the money (M) are functions of real wealth and other variables. Demand for securities depends only upon the interest rate on K, securities (r) and the nominal wealth which they wish to hold. In each of these three assets we assume that the fraction of their wealth in dollars (p) and for S, money (M) is given.
The balance sheet constraint also implies
ratios of desired to available wealth than households. Demand by U.S. wealth holders for all assets diverges, after all, from the sum of the nominal values of the securities and money they currently hold. The sum must be identically equal to the sum of the nominal value of the ultimate wealth holders in, say, the U.K., wealth as defined to be allocating their fixed wealth to a balance sheet constraint. Allocating their fixed wealth to a balance sheet constraint, the behavior of each country's wealth holders in response to disturbances to financial asset equilibrium results account of their current saving when deciding how to hold their wealth. Allocation of wealth among wealth holders does not take account of those of U.S. wealth holders, their demand functions are assumed to have the same general form as those of U.K. wealth holders.

For U.S. wealth holders base their pound denominated nominal (3) $M(x, z)_W = pW$

(2) $M(x, z)_f = p_f$

(1) $M(x, z)_q = p_q$

\[ M(x, z)_W = p_W \]

\[ M(x, z)_f = p_f \]

\[ M(x, z)_q = p_q \]
where \( p \) is the partial derivative of \( b(x, t) \) with respect to \( t \), etc.

\[
\begin{align*}
\frac{\partial}{\partial t} p & = \frac{\partial}{\partial t} \frac{\partial}{\partial x} p + \frac{\partial}{\partial x} \frac{\partial}{\partial t} p = \frac{\partial}{\partial x} \frac{\partial}{\partial t} p + \frac{\partial}{\partial t} \frac{\partial}{\partial x} p \equiv \frac{\partial}{\partial x} \frac{\partial}{\partial t} p + \frac{\partial}{\partial t} \frac{\partial}{\partial x} p
\end{align*}
\]

and equations (1) through (6) we obtain.

A similar relationship holds for the \( u(x, t) \) \( \equiv \frac{\partial}{\partial x} \frac{\partial}{\partial t} w(x, t, \Omega) \).

Identities and equations (1) through (3) we have.

\[
\begin{align*}
M \left[ \frac{\partial}{\partial x} \left( \frac{\partial}{\partial t} p(x, t) \right) \right] & \equiv \frac{\partial}{\partial x} \frac{\partial}{\partial t} \left( \frac{\partial}{\partial x} \frac{\partial}{\partial t} p(x, t) \right) + \frac{\partial}{\partial t} \frac{\partial}{\partial x} \left( \frac{\partial}{\partial x} \frac{\partial}{\partial t} p(x, t) \right) \\
& \equiv M \left[ \frac{\partial}{\partial x} \frac{\partial}{\partial t} p(x, t) + \frac{\partial}{\partial t} \frac{\partial}{\partial x} \frac{\partial}{\partial t} p(x, t) \right]
\end{align*}
\]

price of bonds. From the \( u(x, t) \) balance sheet constraint we have,

\[
\begin{align*}
\frac{\partial}{\partial x} \frac{\partial}{\partial t} p(x, t) + \frac{\partial}{\partial t} \frac{\partial}{\partial x} \frac{\partial}{\partial t} p(x, t) & \equiv M \left[ \frac{\partial}{\partial x} \frac{\partial}{\partial t} p(x, t) + \frac{\partial}{\partial t} \frac{\partial}{\partial x} \frac{\partial}{\partial t} p(x, t) \right]
\end{align*}
\]

\( \text{From the } U.S. \text{ balance sheet constraint we have,} \)

In what follows,

constraints for ultimate wealth holders in both countries repeatedly

contrary, we will use the implications of the balance sheet

two of the three asset demand functions are independent in each

under our assumption of fixed portfolio size in the short run only

constraint in allocating their fixed wealth. All this means that

era. U.K. ultimate wealth holders face a similar balance sheet

demands of a change in either of the two interest rates would be

Technically, the sum of the partial effects on the three assets

one or both of the other two assets by the same amount. More

want more of one asset they want to reduce their holdings of

that it's as the result of an interest rate change, wealth holders

- 12 -
Similar relationships hold for the effect of an increase in \( r \) on both \( u \) and \( u', Q \).

\[
p' > 0, \quad r^+ > 0, \quad m^+ = 0, \quad p' + r^+ + m^+ = 0.
\]

As follows, securities on the portfolio of \( u \). Wealth holders can be summarized by

more formally, the effects of a rise in the interest rate on \( u \). Security

balance sheet balance. The USCB balance sheet identity is given by

balance sheet, the USCB balance sheet identity is given by

assets (\( a \)), and it necessarily a dummy asset (\( s \)) which makes the

assets (\( a \)), and it necessarily a dummy asset (\( s \)) which makes the

securities (\( b \)), the dollar value of the international reserve

securities (\( b \)), the dollar value of the international reserve

the USCB denoted by \( M ^ * \). its assets are its holdings of U.S.

liabilities is the domestic money stock (currency and/or deposits at

consider first the U.S. central bank (USCB). it's only

C. The balance sheets and behavior of the central banks

holding of the security the interest rate on which has risen.

of the other security and money must equal the increase in desired

sheet constraint that the sum of the declines in the desired holdings

security and money decline. Of course, we know from the balance

security and money decline. Of course, we know from the balance

of the security increase while the desired holdings of the other

of the security increase while the desired holdings of the other

if the interest rate on a given security rises, desired holdings

holders in each of the two countries. This assumption means that

are strict across substituities in the portfolios of ultimate wealth.

We assume that the two securities and home country money

- -

- -
of deposits at U.S. commercial banks.

For the implications of the U.K. holding reserves in the form
of securities and deposits at the V.S.B., in chapter VII we make some
currency system where the U.K. holds reserves in the form of U.S.
money. In chapter VII we examine the implications of a reserve
assumption that the V.S.B. does not hold U.S. securities or U.K.

or what changes they choose to introduce will be reflected in which
or they may introduce such disturbances, how they choose to respond
banks may respond "passively" to disturbances to asset equilibrium,
some brief remarks here can provide a sense of direction. Central
banks must be deferred until we have finished laying out the model.

Although a full discussion of the behavior of the central
in 0 , D , and L on the asset side of the V.S.B. and U.K. balance sheets.
assumed to change so as to offset the initial effects of changes
constant throughout the study except in chapter V. 0 and L are assumed to remain
value of one except in chapter V. , 0 and S are assumed to remain. Since \( \frac{D}{D} \) is the negative constant at a
development are considered. Since \( \frac{D}{D} \) is the negative constant at a
throughout the study except in chapter V. Where the effects of
sheet. 0 and L are assumed to remain constant at a value of one
is a dummy asset which may be needed to balance the U.K. balance
is pound value of U.K. holdings of International Reserves, and S
is the pound value of reserve assets so that \( \gamma \). security's \( \gamma \) is the pound price of reserve assets so that \( \gamma \). money stock, \( P \) is the U.K. holdings of U.K.

\( N^s = \gamma_{P} + \gamma_{R} + S \). 

0 is the dollar price of reserve assets. For the U.K. we have,

\( M^s = \gamma_{P} + \gamma_{R} + S \).
emperical determination of allocatable wealth in any particular application.\footnote{We make no attempt to proceed this question of what is the best treatment of these changes and money may be useful. Our treatment is therefore a function of our subjective determination of the underlying factors affecting these changes.}\footnote{It seems to be made up of changes in holdings of short-term (1-year or less) assets, and the supply of short-term securities issued in the two countries. We refer to this as equal to the sum of government deficits and the rate at which claims on the non-Federal sector, $M$, might be included in the consumer sector, $M$, in our non-Federal national income accounts of the capital stock of the U.S. The Federal sector is defined as the sum of the Federal Reserve and the Federal government, and this is the measure of the net claims on the non-Federal sector, $M$.}

\begin{equation}
\frac{\partial}{\partial t} M(t, x, T) = (\Delta F - \Pi) \frac{\partial}{\partial t} \text{demand for these securities by ultimate wealth holders,}
\end{equation}

\begin{equation}
\frac{\partial}{\partial t} M(t, x, T) = \frac{\partial}{\partial t} \text{government deficits. The total supply of U.S. securities,}
\end{equation}

We are now prepared to consider the equilibrium conditions of the market for U.S. securities. The total supply of U.S. securities is based upon translating the central bank's actions into changes in central bank balance sheets and sterilizing behavior. We shall refer to this as equal to the sum of the effects of central bank actions in their balance sheets. They allow for the make change and which
Government securities (depends on the level of allocatable wealth)
that in the short run there demand for money and
securities (including those in the public but not the allocatable
assets of the public). We assume
a situation of market operations on the public sector, so net worth of the
wealth holders which is net of discounts and participation Assumptions.
Under these assumptions the public sector is a closed system, and the net worth of
wealth holders which include their holdings of government
securities. In their role as taxpayers treat government securities as their own.
In their role as taxpayers, as government securities are treated as
assets. An alternative treatment is adopted, support private wealth holders
reasonable assumptions of a model, is not substantially affected if
This treatment affects considerably, but under some
worth of the public.

Simply an exchange of securities for money does not affect the net
worth, under the assumption on open market operations which is
paid by interest on government securities when they are sold that
price, they do not take account of the fact that they will be taxed.
Government securities they hold are part of their wealth or net worth,
assumed that the residents of each of the two countries regard the
levels of the residents of the US and the UK, respectively. It is
in the text the symbols $W$ and $W'$ are used to refer to the wealth

The four market equilibrium conditions are independent:

\[
\begin{align*}
\Pi & = 0, \quad S + R, \quad D + W, \quad \Pi' = \Pi, \quad S + R, \quad D + W, \\
I & = 0, \quad S + R, \quad D + W, \quad I + I' = 0, \quad S + R, \quad D + W, \\
S & = 0, \quad R, \quad D + W, \quad S + R, \quad D + W, \quad S + R, \\
D & = 0, \quad W, \quad S + R, \quad D + W, \quad S + R, \quad D + W, \quad S + R, \\
W & = 0, \quad S + R, \quad D + W, \quad S + R, \quad D + W, \quad S + R, \\
\end{align*}
\]

These four market equilibrium conditions are not

\[
\begin{align*}
M_{(1,1)}^{(1,1)}, & = R, \quad S + R, \quad D + W, \\
M_{(1,1)}^{(1,1)}, & = S + R, \quad D + W, \\
\end{align*}
\]

Money market equilibrium conditions for the two countries as follows:

Using the central bank balance sheet identities we can write the
Three independent market equilibrium conditions are sufficient to determine three endogenous variables. Different sets of three variables are taken to be endogenous at different stages in the study depending upon the situation which is being analyzed. In one important case, for example, the two interest rates \( r \) and \( r' \) and the stock of reserves held by the USCB (\( R \)) are regarded as being endogenously determined and all the variables are considered to be given exogenously. As the analysis proceeds it should be clear from the situation being analyzed which three variables should be regarded as endogenous.

E. A Geometric Presentation of the Model

For most of what we do in the following chapters a geometric presentation of the model will be sufficient though we will revert to algebra in some of the later chapters. We introduce the geometric presentation by using it to describe the equilibrium of the model under a fixed exchange rate system (\( f, c, \) and \( c' \) constant). In Figure 1 we plot four schedules which show the pairs of \( r \) and \( r' \) which are compatible with equilibrium in each of the four financial positions.
causes an excess demand for U.S. securities so that it must restore supply of U.S. securities. This is true because an increase in wealth holders are to continue to be composed to hold the available by an increase in the interest rate on U.K. securities if the rate is increased in the interest rate on U.S. securities must be accompanied by an increase in the holdings of U.S. securities for a given supply of the holdings of U.S. securities by the Federal Reserve equal to the fixed supply of securities issued in the U.S. minus \( r \), for which the private demand for securities issued in the U.S. is equal to the curve labeled \( B \). The combination of these asset markets.
Given our assumption that the two securities are strict gross fixed and solvable for the desired slope we have,

\[ \frac{dF}{dp} = \frac{M}{M'} \frac{1}{p} \]

If the total differential equation (9) with \( p, P, \alpha, M, \) and \( M' \)

postitivity sloped; an increase in \( p \) is required to offset the excess

fixed holdings of \( U, K \) securities by the UCB. The \( F \) curve is

\( U, K \) is equal to the available supply given a fixed total supply and

of \( r \) and \( r' \) which issue that the demand for securities issued in the

The curve labeled \( F \) in Figure 1 represents the combintations

pressure on \( r \).

The vertical arrows in Figure 1 represent the direction of

while excess demand for \( U, S \) securities tends to force down the \( U, S \).

In that sector imply excess demand, an excess supply of \( U, S \) securities

a schedule for a given market indicates that interest rate combinations

in the relevant region of the diagram; a plus sign in a sector near

market is indicated by a minus sign near the schedule for that market

which contain interest rate pairs that imply excess supply in a

the left of \( BB \) there is excess demand for \( U, S \) securities. A region

the \( BB \) curve there is an excess supply of \( U, S \) securities, and to

In order to cut demand back until it matches the excess supply of

- 19 -
The assumption that the two securities are strict gross substitutes ensures that the slope of the PP curve must be greater than the slope of the DD curve. If it is increased while r is held constant, there is held fixed and solving for the desired slope we have,

\[ \frac{dP}{dM} \frac{1}{M \cdot \frac{\mu_i}{\mu_j} + M \cdot \frac{\mu_j}{\mu_i}} = \frac{1}{1 + \frac{\mu_i}{\mu_j}} \]

Totally differentiated equation (10) which is, F, G, M, and W.

The assumption that the three assets held by wealth holders in each of the two countries are strict gross substitutes ensures that the slope of the PP curve must be greater than the slope of the DD curve. If it is increased while r is held constant, there is held fixed and solving for the desired slope we have,

\[ \frac{dP}{dM} \frac{1}{M \cdot \frac{\mu_i}{\mu_j} + M \cdot \frac{\mu_j}{\mu_i}} = \frac{1}{1 + \frac{\mu_i}{\mu_j}} \]

Totally differentiated equation (10) which is, F, G, M, and W.
The excess demand for U.K. securities matches the excess supply than the BB curve as shown in Figure 1, at point $z$. In Figure 1, for U.K. securities is zero. Therefore the PP curve must be steeper.

Of U.S. securities and both kinds of money when the excess demand reallocates the existing wealth. There cannot be an excess supply assets must sum to zero since, at a point in time, people can only allocate constraints for wealth holders. The excess supply for all sheet constraints for wealth holders. The excess supply for U.K. securities is zero, but there must still be an excess supply of U.S. securities since the BB curve has the world excess demand for U.K. securities is zero, but there must be flatter than the BB curve. When the PP curve is encountered, suppose that the PP curve is met first, that is, that the PP curve is raised with the PP and BB curves must be crossed eventually.

As the two kinds of money must increase since money is a strict cross supply of U.S. securities must decline. Also, the excess supply of U.S. securities and U.K. securities in both countries. As if the level then the excess demand for U.K. securities and the excess supply of U.K. securities is increased holding r at its new higher U.K. securities and an excess supply of U.S. securities, U.K. money, for the new, higher r and constant e there is an excess demand for securities, the demand for money in each country must have fallen.

Assumed that money holding are strict, cross substitutability for of U.S. securities at point A in Figure 1. Also, since it is will be an excess demand for U.K. securities and an excess supply of U.S. securities.
positive slope than the BB curve.

Thus the BB curve has a larger

Using the strict gross substitutivity assumption again we can determine

Lem in the denominator can be rewritten as - 1.2, the first

that the three assets held by wealth holders are strict gross

The numerator of this expression is positive given our assumption

\[
\begin{align*}
&\frac{1}{M^2, q \parallel M^2 q} \frac{1}{M^2 (q + u)} \parallel M (q + w) \\
&\frac{1}{M^2, q \parallel M^2 q} \frac{1}{M^2 (q + u)} \parallel M (q + w) + \frac{1}{M^2 (q + w) - 1} \frac{1}{M^2 (q + w)}
\end{align*}
\]

Collecting terms we have,

\[
\frac{1}{M^2, q \parallel M^2 q} + \frac{1}{M^2, q \parallel M^2 q}
\]

\[
\frac{1}{M^2, q \parallel M^2 q} \frac{1}{M^2 (q + u)} \parallel M (q + w) - \frac{1}{M^2 (q + w) - 1} \frac{1}{M^2 (q + w)}
\]

As,

Using the results of footnote 1, p. 12, this difference can be rewritten

\[
\frac{1}{M^2, q \parallel M^2 q} + \frac{1}{M^2, q \parallel M^2 q} - \frac{1}{M^2, q \parallel M^2 q}
\]

we have,

Footnote from previous page.

/If the U.S. money market

or reduces the demand for U.S. money. If the U.S. money market

The MM curve is negatively sloped since an increase in either R

for the public to hold, are plotted as the MM curve in Figure 1.

supply of U.S. money, given a fixed U.S. money supply available

Combinations of R and M that equate the demand for and

- 22 -
The strict gross substitutiveness assumption implies that this expression is negative:

\[
\left(\frac{d^2 u}{dx^2}\right) = \frac{d^2 u}{dx^2} = \frac{d}{dx} \left(\frac{d^2 u}{dx^2}\right)
\]

held constant and solving for the required slope we have

\[
\frac{1}{\lambda} \left(\frac{d}{dx} \left(\frac{d^2 u}{dx^2}\right)\right) = \frac{d}{dx} \left(\frac{d^2 u}{dx^2}\right)
\]

is negative.

Our strict gross substitutiveness assumption implies that this expression is negative.

\[
\left(\frac{d^2 w}{dx^2}\right) = \frac{d^2 w}{dx^2} = \frac{d}{dx} \left(\frac{d^2 w}{dx^2}\right)
\]

held constant and solving for the required slope we have

\[
\frac{1}{\mu} \left(\frac{d}{dx} \left(\frac{d^2 w}{dx^2}\right)\right) = \frac{d}{dx} \left(\frac{d^2 w}{dx^2}\right)
\]

excess demand.

Since the demand for U.K. money, and the area to the left is a region of excess supply of U.K. money, and the area to the right is a sector of opposite directions, the area to the right of NN is a sector of equilibrium when interest rates change, then r and r' must move in the demand for U.K. money. If the U.K. money market is to remain in equilibrium, since an increase in either r or r' reduces the demand for U.K. money, given a fixed U.K. money supply available for the combinations of r and r', that ensure the demand for and the area to the right of NN curve is negatively sloped, there are no combinations of r and r' that ensure the demand for and the area to the right of NN is a sector of excess demand.
The condition for the MM curve to be flatter than the NN curve is given in the previous footnote is met if the expression is positive, that is, the MM curve is flatter (less negative) than the NN curve.

\[
\frac{1}{\sqrt{u}} + \frac{1}{\sqrt{w}} - \frac{\hat{p}}{\hat{m}} = \left| \frac{\hat{p}}{\hat{p}_M} \right| - \left| \frac{\hat{p}}{\hat{p}_m} \right|
\]

Using the results of the preceding two footnotes we have:

would find these two conditions quite plausible.

In Figure 1 the NN curve is drawn with a steeper (more
We have argued above that the four market equilibrium conditions are not independent because of the balance sheet constraints faced by ultimate wealth holders. If three of the four markets are cleared, the fourth market must also be cleared. In geometric terms if three of the four schedules intersect at a common point in Figure 1, the fourth schedule must also pass through that point. As the analysis proceeds it will become clear that it is useful to retain all four schedules even though in a given situation three schedules are sufficient to determine the equilibrium values of the endogenous variables.

It is worth pointing out that interest rate changes above the common intersection point. There must be a third variable not shown explicitly on the graph which can change if we are to be sure that a common intersection point exists. One possibility, which will be explored further in what follows, is that the stock of reserves held by the USCB changes so as to guarantee that the MM schedule, and by implication the NN schedule, will pass through the point of intersection of the BB and FF schedules on the interest rate coordinates.
In Chapter II, we study a key currency reserve regime under which the UK holds at least part of its reserves in the form of US securities, a lower value of which the P/F curve must shift to the left, say to F/P2. A lower value of currencies must shift the supply of these securities to the public remains unchanged.

If there is a shift upward in the demand for UK securities and interest rates is given by the intersection of P0/P2 and P0/P1, and have learned so far. In Figure 2, the initial equilibrium pair of U.K. securities and away from U.S. securities on the basis of what we know about the asset preferences of wealth holders towards an exogenous shift in the asset preference of wealth holders towards the Securitization Markets.

A shift in the asset preferences of ultimate wealth holders towards the Securitization Markets and away from U.S. securities is the total world supply of reserves (N) as fixed in the reserve regime, the total foreign exchange in the form of outside reserve assets. Gold and Functional asset equilibrium under which all international transactions are held in the form of outside reserve assets. Gold and functional asset equilibrium in a regime under which all international transactions are analyzed in the effects of disturbances to the reserve regime. In this chapter, we analyze the effects of disturbances to the outside reserve regime.
offset the orthogonal decline. The markers for both of the two
required in order to raise demand for U.S. securities by enough to
upward say to B1.I. For each level of r a higher level of r is
of this decline in demand for U.S. securities, the BB curve must shift
the available supply of which is assumed to remain fixed. As a result
shift of the same absolute magnitude in the demand for U.S. securities,
shift in the demand for U.K. securities is matched by a downward
shift in the resulting excess demand. We assume that the upward
r must be associated with each value of r after the shift in order

FIGURE 2

- 27 -
We consider first what we call the Gold Standard Policy.

C. Policy Responses by the Central Banks

Consider, in somewhat greater detail, than we have up to this point, upon the behavior of the two central banks which we must now conclude. How this apparent dilemma is resolved depends crucially on the M_0 and N_0 curves, but these two intersection points do not. P_1 curves, and both money markets are cleared at the intersection of the P_1 and B_1 curves. Thus, and both money markets are cleared at the intersection of the P_1 and B_1 curves, and if equilibrium is to be impossible since both interest rates fulfill equilibrium would be impossible since both the two interest rates, for U.K. money and an excess supply of U.S. money.

Intersect at an interest rate at which there is an excess demand relative slopes of the MM and NN schedules, P_1 and B_1 must both share the FF and BB schedules. Given our assumption regarding the assumed shift in asset demands, will result in upward shifts in B_1 curves, the excess demand for the two kinds of money must sum to zero. If there is an excess supply of U.S. money, the two kinds of securities is zero at the intersection of the P_1 and B_1 curves. Since world excess demand for the region of excess demand for U.K. money and excess supply of U.S. money, we have demand P_1 and B_1 and they intersect in a schedule.

Securities would be cleared at the intersection of the P_1 and B_1.
To equal the increased supply, we know that the U.S. money stock in the U.K. must be a lower r if demand for U.K. money is to rise to its new level. The money stock necessary to prevent shifts in NN since for U.S. money is to shrink to match the reduced supply, increases in the NN curve for each r, there must be a higher r if demand shifts in the NN curve. For each r, there must be a higher r if demand increases in the NN curve. Decreases in the U.S. money stock result in a decrease in M and N if demand in the U.S. money stock and an increase in the U.K. money stock. In the U.S., central banks can employ a CSR if it is resorted by a decrease in the dilemma posed at the end of the last section.

Consistent supplies of U.S. and U.K. securities with either altered asset preferences are willing to hold the sterling and the U.K. rate has fallen enough that wealth holders view any change in the U.K. sterling rate as a cause of US dollars. Wealth holders bid for U.K. securities causing extranguline U.S. money and creates U.K. money in equal amounts in convert into outside reserve assets at the U.S. This operation keeps the exchange rate fixed, and the US dollars which they pounds place upward pressure on.' The dollar price of pounds. To upward pressure on T. Sellers of US securities accepting to buy unchanged leads to a selling off of US securities which results in securities with the supplies of the two securities to the public response (CSR). The shift in asset demands from U.S. to U.K.
Markets are determined by asset demands. Some U.K. wealth holders
interest rate parity is the combination which clears the two securities
when both central banks employ a GSR; the new equilibrium
are independent.

Fact that only three of the four market equilibrium conditions
U.K. money market clears at the same intersection point from the
as the U.S. money supply increases which is sufficient to make the
clears at the intersection of Fp1 and Bp1 is exactly the same
decrease which is sufficient to insure that the U.S. money market
interest from its holdings as necessary to keep N's constant. In this
money supply since the UKCB stands ready to sell as many U.K. secu-
international reserves. However, there is no increase in the U.K.
decrease in the U.S. money supply with an accompanying outflow of
of U.S. securities, an increase in U.S. upward pressure on M, and an
asset demand shift in favor of U.K. securities again leads to sales
assume that the USCB pursues a CSFR. Under these assumptions an
a money supply constant policy response (MSCPR). We continue to
supply is "just right" for domestic purposes; then it may be
under a CSFR, suppose that the UKCB believes that the money
allow the money supply to change by as much as would be required
t hat one of the central banks may, however, be unwilling to
employing a CSFR.
neither central bank alters its holdings of domestic securities when
central banks are pursuing a CSFR. It is important to notice that
which are necessary for the realisation of equilibrium when both
of reserves match the adjustments in both countries' money supplies
the new r, i, combination. Changes in the central banks' holdings
U.S. securities and fewer U.K. securities and less U.S. money at
new configuration of r and i. Some U.S. wealth holders hold more
dissatisfaction holders because r is higher or U.K. money given the
They are induced to hold either U.S. securities sold off by
their holdings to accommodate the new demand because r is lower.
who held U.K. securities before the shift have willingly reduced
The U.S. money stock must decline by
held in equilibrium, so r must rise by more than before in order to
the constant supply of U.K. securities must be
decrease in supply reduces to some extent the amount by which
of U.K. securities available to the public is increased by the U.K.
case in which both central banks use a GSR and interest rates because the supply
of both from P' to P'.

UKB required to keep the U.K. money supply unchanged implies a shift
in a sector of MM to M'M where the sales of U.K. securities by the
at point A in Figure 4. The drop in the U.K. money supply results
interest rate path is given by the intersection of NO and P'I.

If it must remain there. All this means that the new equilibrium
U.K. securities does not change so that once BB has shifted to
not be shifted in the new equilibrium. In addition the supply of
we also know that given the policy response of the U.K. NO and
and that MM and NN remain in their orthogonal positions, NO and N'O
that following the demand shift PP and BB shift to P'I and B'I
resolved in a different way when the U.K. pursues a WSCR. We know
are depressed at the end of the last section is
both countries reached according to the GSR.

is lower when the new equilibrium is reached than was the case when
higher, the U.S. money supply is lower, and the U.K. interest rate is

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Instead of trying to stabilize the outstanding stock of the UKCB holdings of U.K. securities are reduced. In contrast to the case in which both central banks pursued a CSER, the U.S. money stock implies a larger U.S. reserve loss than before, employed a gold standard policy response. The larger decline in securities and less money in their portfolios than when the UKCB case since wealth holders as a group must be willing to hold more money and the U.K. money stock must rise by less than in the previous
A WADWP and a TRCWP by the UKCB are the same. Note that if the NN curve is vertical (\( \frac{d}{dx} = 0 \)) then the results of enough to remove the excess supply for U.S. securities since there is cases considered so far in the U.S. interest rate; it must rise by: In this case we have the largest increase of any of the from \( M^{0} \) and \( NO^{0} \) to \( M^{GM} \) and \( N^{GM} \).

parallel to the r axes. The \( NN \) and \( NN \) curves must therefore shift line which passes through the original equilibrium point and which is must intersect \( B_{1} \) at the point \( A_{2} \) where \( B_{1} \) crosses the dashed remains constant. This means that the new PP curve designated \( P^F \).

to the public by whatever amount is necessary to insure that it's value. We also know that the UKCB may increase the supply of U.K. securities since there is no change in the supply of U.S. securities to the public.

is \( B_{1} \) in Figure 5. We know that the \( B_{1} \) curve must remain fixed because the demand shift the relevant PP curve is \( P^F \) and the relevant PP curve different than it was in the two previous cases. Following the asset The graphical analysis in this case is slightly more

\( \frac{1}{T} \)

both money supplies must fall. U.S. interest rate must rise even more than in the previous case and enough securities to keep the U.K. money stock constant the UKCB sells.

keeping the holdings of U.K. securities constant, or selling enough pressures arise as in the two previous cases, but now, instead of USCB employs a CSR. Following the asset demand shift, all the same
Impacts of the asset demand shift on the two countries' money supplies

Although equilibrium is reasserted in each of the three cases, the
The analysis up to this point highlights the fact that,

D. Policy Responses and Target Variables

Portfolios than they had to hold when the UKCB pursued a MCBR.
As a group must hold an even larger amount of securities in their
U.K., money stock must decline instead of rising because wealth holders
stock must decline further than in any of the other cases, and the
no movement in r to help reduce the excess supply. The U.S. money
central banks pursue an INCRP. That is, they both stand ready to
central banks which afford an even happier resolution to the apparent
conflict created by the assumed shift in asset demands. Suppose both
central banks pursue an INCRP. However, there is a set of policy responses by the two

Rather than an INCRP, the USCB, the UKCB might well choose to follow a WSCR or even a CSR.

The USCB is willing to experience some deviation of its short-term interest rate from its desired value. If the

UKCB knows that the USCB is willing to continue to pursue a CSR and if

the USCB is driven away from its desired value. If the

UKCB sees its single instrument to try to reassert the desired value of

the UK’s interest rate while the USCB stubbornly sticks to a CSR,

uses its single instrument to try to reassert the desired value of

counttries are disturbance from their initial levels which for purposes

of discussion we are taking to be their desired levels. If UKCB

holdings of domestic liquidities consistent interest rates in both

it holds. When both central banks pursue a CSR, that is, keep their

policy instruments, the amount of liquidities of domestic residents that

raise of inflation. In our analysis each central bank has only one

variables in its country such as the rate of unemployment and the

from the point of view of the desired values of the ultimate target

securities issued by residents of its country, to be exactly right.

target variable in its country, for example, the interest rate on

shift the USCB and the UKCB each considered the level of the promise

and interest rates are quite different. Suppose that before the demand
In asset demands, the U.K. money supply remains unchanged.

If the U.K. must sell an amount of U.S. securities equal to the shift in the amount of U.S. Reserve Stock, it allows the U.S. money supply to detente by P₀ and P₁ to M₀ and P₀. The U.S. keeps its holdings of U.S. reserves of P₁ and P₀ to M₀ and P₀. The U.S. can then correct the disturbance by detente the amount of U.S. securities and adjusts its holding to U.S. reserves at a rate of P₁ and P₀ to M₀ and P₀. As the disturbance, MN and PP must shift back from schedules must intersect at the same point after adjustment is complete.

This shift in asset demand functions given fixed asset wealth holders toward U.K. securities and away from U.S. money.

This constitution we consider a shift in the asset demands of U.S. constant implies keeping both money stocks constant. To demonstrate it is not in general true that keeping both interest rates

![Figure 6. If both central banks pursue an ICRP all the supply leads to shifts in MN and PP from M₀ and P₀ to M₁ and P₁ which is a shift in asset demands]

8. Another type of shift in asset demands.

ICRP or if they pursue a MSCP.

The same equilibrium point is reached if both central banks pursue an keeping interest rates constant implies keeping money stocks constant.

Policy instruments. It is interesting to note that in this case both are achieved if the central banks properly employ their two say fixed at M₀ and P₀. Thus the two interest rate targets can and by shifting from P₁ and P₀ back to P₀ and P₀. In this case PP stabilize the interest rate on those securities. In that case MN buy or sell enough securities issued in their own currencies to
diminished supply of U.S. securities resulting from the money stock
U.S. wealth holders. The increased supply of U.K. securities and
UKCB sells U.K. securities equal to the amount of pounds it sells to
citizens want to sell as a result of the shift in asset demands. The
securities and converts into reserves the dollars which U.S.
supply which would otherwise result from the fact that the UKCB
buys enough U.S. securities to offset the decline in the U.S. money
and no 0. BB and FF shift to Bb2 and P'F2 respectively. The USCB
equilibrium interest rate path is given by the intersection of M1
However, if both central banks pursue a NSCR the new
of U.K. money at the expense of U.K. securities. The position of the holders is not altered by the increased demand for U.K. securities, the U.S. wealth holders as well as the U.K. wealth holders may be assumed to have an asset demand schedule favor of U.K. securities at the expense of U.S. money and U.K. wealth.

For example, U.S. wealth holders asset demand shift in favor of U.K. securities, but net shift in PP or BB is zero.

Both MM and NN could shift with no net shift in PP or BB if

interest rates will involve a change in both money supplies in the hands of the public. The two kinds of money in the model while stabilizing money involve a change in the supply held by the public or at least one interest rate will involve a change in demand for asset demands involve a shift in asset in the hands of the public.

vice versa but whatever shifts in asset demands involve a shift in interest rates implies stabilizing money supplies in the hands of the public and only shifts in demand for asset demands involve a shift in only two schedules.

We can draw a general conclusion regarding cases in which

interest rates that both interest rates must change,

both money stocks must change while a NSCB by both central banks curves stay fixed, an IRCB by both central banks implies that

If both the MM and NN curves shift while the BB and PP.

order to shift the bb curve from P0 to P2.

equal to the amount of U.S. securities the NSCB must purchase in

the increased demand for U.K. securities. The U.S. loses reserves wealth holders if it falls and it rises even when account is taken of stabilizing operations of the central banks will only be held by...
We have focused our attention on the levels of the two interest rates and on the supplies of the two types of money held by the public and proceed as if the supplies of the two types of securities held by the public was the matter of indifference to the two central banks except in so far as those supplies affect money supplies and interest rates. This approach allows those who prefer to emphasize the importance of "monetary aggregates" to relate our analysis to other available treatments of the same or similar issues. Whether or not the supplies of the two types of securities held by the central banks are variables which should have the same claim to an "equal" role in the analysis as our model attempts to do helps to emphasize the need for asking how important the supplies of securities held by the public really are.
the dollars at the USCB. All this means that in order to insure that assumptions have added to its stock of outside reserves by converting had to buy dollars in the exchange market, and therefore, under our
Thus if the U.S. money stock declines it is because the USCB has
USCB does nothing to directly affect the U.S. money stock.
it can be easily explained. Since it is following a CGB the
Although this result seems at first to be somewhat paradoxical, the change the USCB must add to the excess demand for U.K. securities.
In order to insure that its stock of reserves does not

Policy Response (RSCP)

Policy Response to a Reserve Stock Constant of reserves: that is, it might purpose a Reserve Stock Constant reserves, it might take steps to prevent any further accumulations.
However, if the USCB is satisfied with its holdings of international following asset demand shifts of the type being considered here, and the U.S. lost reserves of the same amount during the adjustment pounds. In each of the cases in section C the U.S. money stock fell holders convert the proceeds of their sales of U.S. securities into pressure on the U.S. rate and upward pressure on the wealth wealth holders try to sell all of U.S. securities there is upward securities and that the USCB is employing a CGB. We know that as a type of possible policy response, assume again that asset demands for convenience in exposition we have been ignoring one

F. The Reserve Stock Constant Policy Response

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of U.K. securities.

Increase their holdings of U.K. money while reducing their holdings up the rest of the initial excess supply of U.S. securities and amount of money as before the demand shift. U.K. wealth holders take securities and surrender some U.K. securities but hold the same wealth holders take up part of the initial excess supply of U.S. securities.

Wealth holders as a group must hold fewer securities. It is possible to derive F' from F to F' to F"4 and NN from N0 to N"4. This stock of reserves constant the UKCB must purchase enough domestic P0 and B0 to F' and B' as shown in Figure 7. In order to keep P0 and B0 to F' and B' as shown in Figure 7.

The original change in asset demands shifts P" and BB from they did before the shift in asset demands even though it rises somewhat. enough so that U.S. citizens are persuaded to hold as much money as an expansionary open market operation in order to drive its down further the UKCB is assumed to be pursuing a GSR here, the UKCB must pursue the U.K. interest rate falls, and the U.S. money stock falls. Since the kind considered here that both countries do not change their holdings of domestic liabilities, the U.S. interest rate rises, which both countries pursue a GSR after an asset demand shift of which both countries are content to hold the money stock which they held before its reserve stock does not change the UKCB must see to it that U.S.

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That we now turn to a consideration of these interactions, and it is to a consideration of these interactions that we now turn. Variables change for any reason, central banks may wish to undertake the existing equilibrium or the desired values for some target values. If some target variables do not have their desired values in the initial equilibrium at least two target variables and their desired demands. When we treated central bank objectives, we assumed that in banks to assert equilibrium which take the form of shifts in assets and implications of the way in which central banks respond to disturbances up to this point we have concerned ourselves with the

G. Policy Responses and Policy Interactions

FIGURE 7
their holdings of U.S. securities by a given amount and then to allow curves with the (0) subscript. If the U.S. authorities plan to increase initial equilibrium position is given by the intersection of the U.K. policy responses to a CSPI undertaken by the U.S. As before, the using Figure 8 we can trace the implications of different other central banks.

Taking it depending upon the policy response being pursued by the for the money stock and the interest rate of the country under-

Given size. This policy interaction will have different implications

which corresponds to the CSPI is an open market operation of a purchase of a given size by the central bank. The policy interaction call a gold standard policy interest (CSPI), is just an open market assets at a new higher level. This policy interaction, which we will additional domestic assets and to stabilize the holdings of domestic

have been too contractionary. It might decide to purchase some response but decides that the results of its behavior for the economy

Suppose that a central bank has been following this kind of policy have called a CSPI a domestic assets constrained policy response.

as the result of disturbances to asset equilibrium. We could as well reserves, and the interest rate on domestic assets which occur accepts passively the changes in its money supply, international central bank keeps its holdings of domestic assets constant and response and policy interactions. If it is following a CSPI, a

It is useful to consider the correspondence between policy
equilibrium is at the intersection of NO and B1 at point A. If the NKCB decides to pursue a MSCP, the new equilibrium will be at point A2. An ICPP by the NKCB implies that the new equilibrium at point G1. An ICPP at the intersection of PO and B1.

The new equilibrium is given by the intersection of PO and B1. It follows a GSP, that is, if they neither buy nor sell U.K. securities, a GSP, the new equilibrium must be on the new BB curve. If the NKCB hold a reduced supply of U.S. securities only if it is lower. Following say from PO to B1 since, for a given value of F, the public will hold no further changes in these holdings, the BB curve must shift down.
securities at the orthogonal interest rate path.

U.S. securities. They are satisfied with their holdings of U.K.
more specifically, U.S. wealth holders have an excess demand for
residents' domestic investment is exerted on both of the interest rates.
excess money holdings by making net purchases of securities from U.K.
domestic liabilities constant. As U.K. interest rate and keeps the holdings of
money stock and the U.K. interest rate and keeps the holdings of
under which it passively accepts whatever changes occur in the U.K.
First consider the case in which the UKCB follows a CIR

UKCB,

residents is removed depends upon the policy response pursued by the
rate combination. How this imbalance in the portfolios of U.S.
are satisfied with their holdings of money and securities at this interest
orthogonal interest rate path R0 to R1. Whereas U.K. residents are
excess supply of money and an excess demand for securities at the
follow the open market purchase U.S. wealth holders have an
only if it is lower. Our assumption also implies that immediately
wealth holders will voluntarily hold the increased supply of money
B0 to B1. This must shift from M0 to M1, for a given r, U.S.
model. Our assumption means that, in addition to the shift of bb from
model as he likes. This fiction in no way affects the results of the
securities for U.S. money but that he is then free to adjust his port-
USCB tells each U.S. wealth holder that he must trade some of his U.S.
its wants from U.S. wealth holders at unchanged interest rates. The
we adopt the convenient fiction that the USCB purchases the securities
In order to facilitate further exposition of these results
private wealth holders in the amount required to keep i from falling.

and, in contrast to the previous case, supplies U.K. securities to residents. The UKCB sells pounds to retire the upward pressure on £, as U.S. wealth holders make net purchases of securities from U.K. both interest rates and upward pressure on £, the dollar price of pounds, by the USCB with an IBRPR. As before there is downward pressure on £. Suppose now that the UKCB reacts to an open market purchase operations into reserve assets.

UKCB converts the proceeds of the exchange rate stabilization loans reserves equal to the decrease in the U.S. money supply as the through at the point of intersection of P$_{Bd}$ and P$_{Bp}$. The U.S. purchase is shown by the shift of M from M$_1$ to M$_2$ which passes stock from the level of reserves immediately following the open market purchase because of the lower interest rates, the decrease in the U.S. money supply will lead to surrender these securities and hold more U.K. money partially by net purchases of securities from U.K. residents who are interest rate decreases which raise the U.S. demand for money and initial excess supply of money in the U.S. is removed partly by neither central bank pursues any offsetting measures. Thus the supply and raises the U.K. money supply by equal amounts since buy dollars for pounds, an action which reduces the U.S. money order to keep the dollar price of pounds from rising the UKCB must and upward pressure is exerted on the dollar price of pounds.
extracting with U.K. securities and the rest with U.K. money instead.

A part of that reduction of the U.S. money stock which is absorbed and
supplied declines more in this case. The UKCB, in effect, replaces

because both interest rates are higher and since the U.S. money
do not rise as much as U.S. money holdings have fallen. This must
be the case since equilibrium U.K. money demand is less than before.

Contrast to what we observed in the previous case, U.K. money holdings
larger loss of reserves by the U.S. It is important to note that, in

Corresponding to the larger decline in the U.S. money supply is a
shift of M from M₁ to M₂ which passes through point A₂.

and the UKCB. The decline in the U.S. money stock is shown by the
money is removed by net purchases of securities from U.K. residents
of the U.S. demand for money and more of the initial excess supply of
money in the U.S. is removed by interest rate declines which raise
this case as it did before, less of the initial excess supply of
was pursuing a CSER. Since neither interest rate falls as far in
with a reduced supply of U.S. securities as it did when the UKCB
r need not fall as far in order for wealth holders to be satisfied.

Supply must be greater in this case. Since the UKCB is stabilizing it,
the U.K. money supply rises, but the reduction in the U.S. money
contrasted the new PP curve. Here again the U.S. money supply falls and
the original equilibrium point and parallel to the x-axis. We have
it pass through A₂ where P₁ intersects the dashed line drawn through
the provision of securities by the UKCB shifts PP down from P₀ until

This provision of securities by the UKCB shifts PP down from P₀ until
The curve which passes through point A. The corresponding reserve money stock in this case is shown by the shift of MM from M to M'.

An increase in the UK's money stock leads to a decrease in the U.S. demand for excess supply of money in the U.K. is removed by increased demand for either of the two previous cases. Thus, even less of the original banknote supply of U.K. securities is held in bonds. The new equilibrium, but not as far as in the previous case, the fact that larger open market sales are undertaken implies that the UK stock of money, so preventing an increase in the money stock must involve even larger open market sales by the UKCB than were required.

We have seen, stabilizing M involves again an increase in the money stock until it passes through the intersection of B1 and N0 at point A. The new PP curve is not shown, as the operation shifts PP down until it passes through the intersection equal in pound value to the dollars it absorbs. The sterilization run down their excess money balances, the UKCB sells U.K. securities at all when it pursues a MPCR. Forced to support 25% of its money stock when it pursues an MPCR, it acts to prevent any increase while the UKCB allows some increase to occur in the U.K.

Less money than it did immediately following the policy initiation available to the world's wealth holders contains more securities and assets of simply taking in dollars and supplying pounds. The mix of assets
both securities are reduced both interest rates must end up lower than
the intersection of $P_1$ and $M_1$ at point $A$. Since the supplies of
securities to shift $PP$ from $P_{0}$ to $P_{2}$ so that it passes through
money. To achieve its desired result the UKCB must buy enough
U.K. securities less attractive relative to U.S. securities and U.S.
to the downward pressure on $r$ by buying U.K. securities so as to make
decrease downward pressure on $r$ and upward pressure on $ml$ it must add
net purchases of securities from U.K. residents. When the UKCB
cannot get purchases of securities from U.K. residents will not make any
concentrates with the money holdings they acquire as a result of the
must see to it that interest rates move so as to make U.S. residents
response a MSER. In order to keep from exhausting reserves the UKCB
we know that the UKCB can pursue a fourth kind of policy

- two cases or in the orthogonal position.

proporportion of U.K. securities then it is do in either of the other
equilibrium world supply of securities contracts a relatively higher
before the policy interest rate than in the other two cases. The
securities available to wealth holders is more like the orthogonal mix
exchange market with U.K. securities. The final mix of money and
fraction of the U.S. money stock which it receives through the
money the UKCB takes measures which are tantamount to replacing the
golden case, instead of being content to trade U.K. money for U.S.
follows a MSER represent the polar opposite of its actions in the
loss is, of course, larger here too. The actions of the UKCB when it
account of how different policy responses affect the results of a response to a CSPI in some detail, we provide a somewhat briefer account of the implications of different policy responses to a CSPI.

Since we explored the implications of different policy purchases dependent upon what policy response is being employed by the other central bank, this money stock cannot involve different levels of the domestic asset. In achieving the new target, money stock rather than a new value for the central bank's holdings, but what differences exist from a CSPI is that a new value for the domestic securities in the open market, of course.

level. This money stock constant policy interest (MSCPI), or interest that the domestic money supply is sterilized at a new higher interest rate. The impact of disturbances, its effect, and the necessary actions to correct them is that, although this is the rate that has been chosen to maintain a value of the money supply to the market from the central bank has been following a MSCPI, that is, it has been a type of policy response besides the CSPI. For instance, it is a counterintuitive which corresponds to the other central bank.

original sale called for by the CSPI.

residents make no net purchases or sales of securities after the open market purchases of the USCB. They must do so since U.S. residents concern to increase their money holdings by an amount equal to the amount of securities in the original position. At these lower rates, K, residents are

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money stock. The relative size of the required purchase is indicated by the size of the open market purchase larger than the desired increase in the money stock following an increase in the U.S. money stock from the level represented by M'1. The U.S. must operate to obtain an increase in the U.S. money stock by the size of the open market purchase when the U.S. follows a CSR. Thus in operations, as we know from above, the ultimate increase in the U.S. money stock follows an open purchase by the U.S. if less than the CSR by the U.S. implies that under takes no open market operations. A CSR by the U.S. implies that all the variables in the model have the same implications for the behavior of the open market purchase relative to operations. Suppose the U.S. money stock at the level represented by M'0 differ keeping the U.S. money stock at the level represented by M'0. Suppose the U.S. has been
resulting from an open market purchase of a given size is extraneous

significantly more of any initial increase in the U.S. money supply
these two cases. These results arise because, as we have seen above,
by the gap between Bp1 and Bp2, and the gap between Bp2 and Bp4 in
or a MSDF. The successively larger U.S. reserve losses are represented
the money supply represented by \( \text{M}_1 \) if the MSDF pursues an IRCP
show that the USGO must make even larger open market purchases to achieve
a completely analogous method of argument can be used to
represented by the gap between Bp1 and Bp2.

exceeded the larger increase in the money stock, it can also be
just equal to the amount by which the original open market purchase
since the reduction in the U.S. money supply or the U.S. reserve loss is
which are equal to the U.S. reserve losses, cause \( \text{M}_1 \) to shift back to \( \text{M}_1' \).
from U.K. residents. The net purchase of securities by U.K. residents,
point \( A_2 \) and partly by net purchases of securities by U.S. residents.
decline in interest rates from \( T_0 \) to 0 to the levels represented by

excess supply is removed partly by a

securities in the U.S. The excess supply is removed partly by
By the USGO there is an excess supply of money and an excess demand for
position (not shown) below \( \text{M}_1 \). Just after the open market purchase
open market purchase represented by \( B_2 \), the \( \text{M} \) curve is shifted to a
corresponding to \( B_2 \) must lie below \( \text{M}_1 \). Immediately following the
tersection of \( D_0 \) and which lies below \( B_1 \). The \( \text{M} \) curve
which passes through the new equilibrium point at \( A_2 \) where \( \text{M}_1 \)
by the fact that the BB curve must be shifted from \( D_0 \) to \( B_2 \)

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The UKCB pursues a RSCP. Policy responses with the same labels represent the same assumptions about policy interactions and policy responses in the open market. Policy responses are required to achieve %1 %1 when the USCB pursues other policies. It is interesting to compare the size of the open market purchases by %1 and for the USCB. %1. In this case, the equilibrium for B(1) is the interest rate which would emerge from the GSPF corresponding through a point parallel to the r-axis. We have chosen it because it illustrates different policy responses by the USCB. The GSPF is drawn as the dashed line drawn by the USCB. A single line in Figure B is for the GSPF. It was reached after the policy interactions and various policy responses were reached. Suppose the policy interactions by the USCB considered above the equilibrium which USCB wants to lower r from R0 to R1 in Figure 9. Under both types of policies, USCB response being followed by the other central bank. Suppose that will involve different sized open market purchases depending upon the base being pursued. An expansionary ICRP by one central bank has been pursued. An ICRP by an expansionary ICRP by one central bank involves the setting.

Following the logic employed so far, we can see that an ICRP by the USCB to an ICRP by the other central bank, larger and larger net purchases of securities by U.S. residents as we move from a
The open market purchase required to achieve is the one

down to \( M' \) results in a new equilibrium at point 4 where \( r \) is lower.

Suppose the WCB is following a GSR. Our earlier analysis

**Figure 9**
following the open market purchase is $M_{3}\rightarrow M_{5}$. Following the open market operation we have the familiar pattern of excess supply of money and excess demand for securities in the U.S. Point $a$ is reached as part of the excess supply for money is removed by the decline in interest rates from $r_{0}$ to $r_{0}'$, and part is removed by the purchase of securities by U.S. residents. The final $M_{1}$ curve is $M_{5}\rightarrow M_{6}$. The reserve supply decline associated with the movement in the $MM$ curve from $M_{6}\rightarrow M_{5}$ to $M_{6}\rightarrow M_{5}$ or, what is the same thing, the sum of the money supply decline represented by the shift from $M_{1}\rightarrow M_{1}$ to $M_{5}\rightarrow M_{5}$ and the amount of the open market purchase represented by the movement from $B_{1}\rightarrow B_{2}$.

Using the same method of proof we can show that the USCB must undertake more substantial open market purchases in order to reach $r_{1}$ if the UKCB follows an IRCPR or a MSFPR. More substantial open market purchases are required in each of these two cases because the objectives of the UKCB lead it to sell U.K. securities, an action which relieves the downward pressure on $r$ generated by an open market operation of a given size. The successively larger U.S. reserve losses are given by summing the amounts represented by the shifts from $B_{1}\rightarrow B_{2}$ and from $M_{3}\rightarrow M_{7}$ under an IRCPR and by summing the amounts corresponding to the shifts from $B_{1}\rightarrow B_{2}$ and from $M_{3}\rightarrow M_{7}$ under a MSFPR.
can reveal what is involved in a RSCI. An example will suffice.

This is in detail since a careful study of the cases already considered
pursuing a GSPR, a MSPI, or an IRCP, there is little need to show
have to be determined by whether the „passive“ central bank is
the open market. Exactly what the magnitude of these purchases would
central bank would undertake purchases of domestic illiquidities in
in order to achieve a decrease in reserves the „active“

IRCP but is incompatible with an RSCI.

The holdings. Thus a RSCI is consistent with a GSPR, a MSPI, or an
holdings of reserves at the other central bank is willing to reduce
which are fixed in supply, the central bank can only increase the
for an RSCI. When the only reserves in the system are outside assets
the UKCB, but the objective can be achieved. The same cannot be said
USCB depending upon the type of policy response being pursued by
Of course, these initiatives may require different actions by the

which of the four types of policy response are pursued by the UKCB.
a GSPR, a MSPI, or an IRCP, it can accomplish the objective in no matter
policy initiatives we have considered. If the USCB wants to undertake
there is an important difference between the RSCI and other

reserves.

Reserves might decide that it now wants a smaller stock of international
determined in the past to maintain a given stock of international

Policy Initiative (RSCI). For example, a central bank which has been
Corresponding to the RSCI, there is a Reserve stock constant

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Refer again to Figure 8. Suppose the U.S. wants to lose reserves in the

analyzer above should convince the reader that smaller open market

pursue open market purchases large enough to shift B to B1 and

to believe that the U.K. will react with a CSR. The USCB should then

amount corresponding to the shift from M1 to M2 and it has reason

Purchases would be required in order to achieve the same decline in

reves under an IRCPR or a MCSR by the USCB.
International reserve ratios

Bank allowance is the money supply to fail the level in the stock of currency reserve against the country's current central bank reserves. The level in other countries will have to fall by more than the key level in the U.S. unless the dollar is appreciated.

Royer (1980) has argued that if current reserve ratios are taken to be corrective action, to take corrective action.

It is widely believed that if other countries will accept U.S. dollars in exchange rate support operations, the U.S. is not put under pressure to adjust, but the other countries will be under pressure persistently if the demands for dollars exceed the amount when the U.S. is not appreciated.

It is argued that the pressure to take corrective action is the face of the key currency reserve regime.

Some aspects of the key currency reserve regime have focused considerable attention.

The key currency reserve regime

Changes in central bank holdings of key currency denominated assets.

We call the regime under which changes in reserves take the form of changes in central bank holdings of key currency denominated assets,

"key currencies" and that a large proportion of international reserves are held in the form of claims denominated in so-called "key currencies".

In this century, the most significant proportion of the reserves of many countries have been held in the form of claims denominated in so-called "key currencies."

In the form of outside reserve assets like gold or SDR's. However, a

at this point we have assumed that all reserves were held

A. An Overview

1. The Key Currency Reserve Regime

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had an adverse effect on the U.S. capital account.

Some analysts argued that the interest rate developments
as much as they had been expected to rise for various reasons. Some
securities helped to keep U.S. short-term interest rates from rising
that the conversion of dollar exchange to interest-bearing
Journal of Commerce, April 15, 1972, p. I. Some analysts believed
widely discussed in the financial press. See, for example,
official purchases of U.S. securities on U.S. interest rates were
in the spring and summer of 1972 the impact of large foreign

adequate tests of many of the previous discussions of models which
specified the markets for securities. These markets have not been
a central feature of our model is the way in which we have
neglected problems.

A natural framework within which consider these relatively
when they neither buy nor sell domestic assets. Our model provides
outside reserve regime when central banks remain passive. That is,
in reserves under the key currency reserve regime then under the
determine whether or not given disturbances result in larger changes

deficits for U.S. financial variables. It is also useful to
find any discussion of the implications of security financing of U.S.
the outside reserve regime. One must turn to the financial press to
that they are operating under the key currency reserve rather than
and pursuing the same objectives must modify their behavior given
other aspects of the key currency regime have received less attention.
Conclusions from the model presented in Chapter II will the necessary
modifications in our model are required. The four key
market equilibriums

In order to analyze the key currency regime some minor

B. Modifications in the Model

for U.S. securities.

Regime to have a model when takes explicit account of the market
passive. It is particularly useful when studying the key currency
securities available for the public to hold when central banks are
changes lead directly to a reduction in the amount of key currency
changes are held in the form of key currency securities, reserve

However, under the key currency reserve regime where reserve
when central banks keep their holdings of domestic assets constant.
reserve assets were associated with changes in national money supplies
the outside reserve regime changes in central bank holdings of
the outside reserve regime changes in central bank holdings of
more important for studying the key currency reserve regime. Under
A careful specification of the securities markets is, if anything,
money stocks constant usually lead to a change in interest rates.
since the changes in the supplies of securities required to keep
insulating the economy from the effects of disturbances to equilibrium
reserve changes on money supplies does not in general completely
contrary to the view held by some, sterilizing the effects of
economy. For example, in the last chapter it was shown that,
one of the avenues through which changes in reserves may affect an
allow for capital movements, as a result these discussions have missed

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pertinent given recent history, a shift in preferences away from U.S.
we consider a type of shock to asset equilibrium which is especially
To illustrate how the key currency reserve regime operates

C. A Speculative Shift

The regimes even though all the same positions are attainable.
Immediate after a given disturbance may be different under alternative
changes. For these two reasons the equilibrium position actually
are held may affect the way in which central banks react to reserve
alternative reserve regimes. In addition, the way in which reserves
operations to arrive at the same equilibrium position under the two
reserve regime. However, the two central banks must undertake different
are the same under the key currency regime as they were under the outside
of possible new equilibrium positions following a given disturbance
framework that we have employed previously, as we shall see the set
modified equations can be represented using the same graphical
that adding the four equations together yields an identity. Theour equations are independent, a fact which can be verified by nothing
represented by $M$, and $W$, respectively, as before, only three of the
holdings of U.S. securities and U.S. money by the U.K., are

\[(12a) \quad M(1,1,1,1)^n = (1, S + R, R, p_1, p_2, \varphi) \Downarrow \equiv N_S \Downarrow\]

\[(12b) \quad W + M(1,1,1,1)^n = S + R, \varphi + p_1, p_2 \equiv W \Downarrow\]

\[(10a) \quad M(1,1,1,1)^n = (1, p_1, p_2, \varphi - \varphi) \Downarrow \equiv P_S \Downarrow\]

\[(9c) \quad M(1,1,1,1)^n = (1, p_1, p_2, \varphi - \varphi) \Downarrow \equiv P_S \Downarrow\]

Alterations are summarized in the following equations:
Interest rate pair \((r^0, r^1)\). As wealth holders seek to rebalance their U.K. securities and an excess supply of U.S. securities at the original offer U.S. securities, following the shift there is an excess demand for constant. The U.K. follows a CSQR and accumulates reserves in the form follows a CSQR, that is, it keeps its holdings of U.S. securities.

**Figure 10**

![Graph showing the relationship between interest rates and securities]

Move from \(B_0\) to \(B_1\) as in Figure 10. We assume that the USCB shift in preferences causes \(PP\) to move from \(P_0\) to \(P_1\) and \(BB\) to regarding the exchange rate. As we saw in Chapter III above such a securities and toward U.K. securities due to a change in expectations.
In order to sterilize its money stock, the key currency country must actively pursue open market purchases of marketable securities from the public. When non-key currency countries hold reserve changes in the form of any kind of non-marketable assets, they are not sterilizable. To study the effects of this form of sterilization, some of the recent increase in dollar-denominated interest-bearing assets held by foreign official institutions that come in the form of U.S. securities available to private holders. It rises but by less than if the Western European countries reduced their dollar holdings and the security purchases by the UKCB to sterilize the key currency country's money supply.

The purchase of U.S. securities in the open market, when the non-key currency country holds changes in reserves in the form of key currency securities, immediately uses the dollar proceeds of its support operations to sterilize its money supply. These operations result in a rise in the U.K. money supply and upward pressure on £. The UKCB buys dollars for pounds in support of its portfolios; they exert downward pressure on £, upward pressure on £,
II and IV in Figure 10. Given this configuration the NN curve must
directly from the shock in regions of excess demand for one type of
money and excess supply of the other. These regions are designated as
directly from the shock must intersect between the MM and NN curves resulting
where the form of the disturbance the DD and FF curves resulting directly
on securities than if IT holds these changes in outside assets, no matter
to asset equilibrium at the UKC holds reserve changes in U.S.
passive, U.K. reserve holdings will fluctuate more for given shocks.
It is generally the case that when both central banks are

regime than would occur under an inside reserve regime.
reserves by the non key currency country under a key currency reserve
convention that the same shock may lead to a greater accumulation of
to reach a2 than to reach a1. This conclusion demonstrates the
in reserves for the U.K. since NN must shift down further from N0
position would have been at a1. Position a2 implies a larger increase
U.K. had held all reserve increases in outside assets the equilibrium
P1 and the orthogonal MM curve at a2. We know from above that if the
shift of NN from N0 to N1 which passes through the intersection of
is identical to the increase in U.K. reserves is represented by the
increased U.K. money stock. The increase in the U.K. money stock which
rates to reduce their holdings of U.K. securities and to hold the
U.K. residents are persuaded by the changes in interest

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always shift further to reach the intersection of the new FF and M curves than to reach the intersection of the new FF and BB curves. The analysis above suggests that the European countries might have had to accumulate fewer reserves preceding the formal suspension of dollar convertibility in August 1972 if they had taken our model can be used to show that the size of European reserve accumulations could have been limited in exactly the same way if Europeans had held reserve increases in the form of U.S. money instead of in the form of U.S. securities. They would still have had to accumulate de facto convertible dollars, but the amount would have been smaller. There would, of course, have been a loss of interest income on securities. In terms of our model, the demonstration of this contention is quite straightforward. If we continue to assume that both central banks are passive the new equilibrium following the speculative shift is the same when reserve changes are held as key currency money as the equilibrium reached under the outside reserve regime. The UKCB accumulates dollars and supplies pounds in support operations but does not convert the dollars into either outside assets or U.S.

1/ It is not possible to make a general statement about the relative movements of the two interest rates between equilibria under the two different reserve holding regimes. Depending upon the type of disturbance to equilibrium the initial equilibrium pair of interest rates (r0, 0) may be anywhere inside the four sided figure bounded by the new M, NN, MP, and BB curves or even outside this figure.
Instruct the public to keep the money supply on target. It forestall
from the public. The USCG would have bought enough securities as
U.S. money market than using them to purchase U.S. securities
chosen to hold the proceeds from their support operations. In the
behaviour of interest rates is forestall official institutions had
larger in the summer of 1972, it would have made no difference for
monetary authorities were pursuing a money supply

1 / If the U.S. monetary authorities only offset
or non-interest-bearing assets, of course, if the USCG only offsets
interest-bearing assets. In either case, the new equilibrium is at 42. The only
purchases. In either case, the new equilibrium is at 42. The only
the form of U.S. securities, the USCG will do so through open market
disturbances to asset equilibrium by holding reserve changes in
USCG does not stabilize the interest on the U.S. money supply of
Regardless of how the USCG holds its reserve changes, then if the
we find that if the USCG is going to follow, for example, M3
as we have been assuming up until now. Turning again to the model
central bank of the key currency country would remain passive
de facto or de jure convertibility. It is not necessary to assume that
effective convertibility and in key currency money during periods of
should hold reserve changes in outside assets during periods of
Key currency countries want to maintain reserve Euclifations. They
we should not be too quick to conclude, however, that it cannot
are held as money as when reserve changes are held as outside assets.
age of U.K. reserve changes are exactly the same when reserve changes
this is exactly what happened under the outside reserve regime. The
supply changes until equilibrium is restored, established at point A, but
securities. Thus the U.S. money supply falls and the U.K. money

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part of any decline in the U.S. money stock the UKCB can reduce its reserve accumulation to some extent, at some cost in terms of interest foregone, by holding reserve increases in non-interest bearing assets.
A shift in asset demands occurs at the same time as a devaluation. Later, we consider the case in which of conventional arguments. In order to highlight what we believe to be a necessary modification to second here the less realistic case of an anticipated devaluation. We can bury shifts back if no further devaluation is expected. We can away from the securities of the country which is expected to devalue. After the devaluation has occurred asset demands shift}

\[ \text{dollars, since the exchange rate cancels out in both compartments.} \]

\[ \text{\text{dollars, at time zero before the devaluation.}} \]

\[ \text{dollar placed in U.S. Investor computes the proceeds from one dollar placed in U.S.} \]

\[ \text{Under these conditions a real change in the exchange rate has no effect on the relative attractiveness of domestic and foreign assets, there is no incentive for wealth holders to reallocate their portfolios of financial assets following a devaluation.} \]

\[ \text{It has often been argued that since an exchange rate change} \]

\[ \text{The effects of a devaluation on financial asset holdings} \]
of outside reserve assets. In 0, the pound price of outside reserve assets may be reflected in a change in 0, the dollar price of relative asset holdings.

The dollar price of relative asset holdings is not well suited for an illustration of these effects, so we abstract from them here.

Our model is not well suited for an illustration of these effects, so we abstract from them here.

Conclude a devolution of the dollar in the framework of a model. U.S. citizens experience a capital gain or a capital loss. Consider a devolution of the dollar in the framework of a model.

Thus when the wealth effects of the devolution are taken into account, the wealth change is wealth and the form in which the change has occurred with the wrong mix of assets at the prevailing interest rate given the wrong mix of assets at the prevailing interest rate given the wrong mix of assets. For example, relative asset holders experience capital gains and relative asset holders experience capital losses as a result of the devolution and the exchange rate change as before. Thus, the argument proceeds.

This argument is correct as far as it goes. What it ignores is the fact that some wealth holders experience capital gains and that these changes in wealth are realtively small in the first instance. There should be no incentive for wealth holders to alter their portfolios.

U.S. and U.K. securities have the same relative asset holdings.
We continue to assume that asset demands are homogeneous of degree 1:

\[
\frac{dS}{dR} = \frac{dS}{dP} \frac{dP}{dR} = t^2 \frac{dP}{dt} \frac{dR}{dt} = t \frac{dP}{dt} \frac{dR}{dt} = \frac{1}{T} \left( \frac{dP}{dt} \right) \frac{dR}{dt} = \frac{1}{T} \left( \frac{dP}{dt} \right) \frac{dR}{dt} \]

Their impact on changes in the domestic currency value of \( c \) and \( D \) on the domestic currency value of reserves hold by central banks depends upon how much of the devaluation is reflected in \( c \) and how much is reflected in the dollar value of reserve holdings. The impact of a devaluation on the value of reserve holdings, \( c \), and \( D \), is given by:

\[
\frac{dP}{dt} \frac{dR}{dt} = \frac{1}{T} \left( \frac{dP}{dt} \right) \frac{dR}{dt} \]

Even if only the current price of \( c \) and \( D \) alter the domestic currency value of the initial reserve assets or in both, of course,
excess demand for U.S. securities and an excess supply of U.K. securities and a world excess supply of U.K. securities. In Figure 11 the pre-devaluation equilibrium is at the intersection of the schedules with the \( \phi \) subscript. The impact effect of the devaluation is shown by the schedules labeled with the \( \phi' \) subscript. For reasons discussed in detail above the new FF and BB curves must intersect between the new MM and QQ curves.
must intersect between the new P and Q curves.

For reasons discussed in detail above the new P and Q curves or U.S. money to influence imbalances it will increase the supply of

If the UKCB uses U.S. securities instead of outside assets

again,
curves back to their original positions so that they intersect at
the actions by central banks described above is to shift all the
of U.K. residents or $(1-F_p + (1-p')_B)^m$. Of course, the effect of
of U.K. citizens or $U.K. = C + L$ citizens plus the purchases of U.S. securities
unwanted U.K. securities. U.K. reserves are equal to the sales
must meet the demand for U.S. securities and the UKCB must absorb the
U.S. securities. If interest rates are to remain unchanged the USCB

will deposit additional pounds into dollars in order to buy $(1-F_p + (1-p')_B)^m$

money and $(1-F_p + (1-p')_B)^m$ in U.S. securities. U.K. residents want to sell
remains constant. U.S. residents want to diversify their reserves of
portion of wealth held in each asset by residents of both countries
money. If interest rates are held constant by central bank action the

and the UKCB holds changes in its reserves as outside assets of U.S.

to begin with the case in which both central banks pursue an IPCP
upon the policy responses of the USCB and the UKCB. It is instructive
of interest rates and the required changes in reserve holdings depend
as we have come to expect by now the ultimate configuration

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rate to rise and the U.K. interest rate to decline by the amount
and the U.K. buys enough U.K. securities to cause the U.K. interest
where MN and N'N intersect. The USG sells enough U.S. securities
when they follow AGSPR's implied that equilibrium must be at point A2
completely monetary sterilization by the two central banks
represented by either the shift in MN or the shift in NN.

equal amounts. The shift of reserves from the U.K. to the U.S. can be
The U.S. money supply increases and the U.K. money supply decreases by
securities. MN and N'N must shift down until they pass through A1.
initial excess demand for U.S. securities and excess supply of U.K.
If P1 at A1 is reestablished, the new equilibrium is at the intersection of A1 and
follow AGSPR's, the new equilibrium is at the intersection of B1 and
used to finance payments imbalances. Find that if both central banks
returning again to the assumption that outside reserves are
order to keep U.S. interest rates from rising.
order to keep U.S. interest rates from rising.
rate to rise because U.S. citizens are selling off U.K. securities partly
the initial excess demand for U.S. securities at the original interest
U.K. residents. This increase in the supply of U.S. securities by
U.S. citizens plus the amount of the purchase of U.K. securities by
U.S. securities by the full amount of the sales of U.K. securities by
Interest rate given the U.K. interest rate on Pi remains unchanged to
short of the excess demand for U.S. securities at an unchanged U.S.
the U.S. money stock constant, and these sales may exceed or fail
either the USCB or the UKCB sells off enough U.S. securities to keep
securities. The U.S. rate may rise (as in Figure 11) or fall since
interest rate on Pi remains unchanged to hold the unchanged supply of U.K.

In this case the U.K. interest rate must rise in order to induce re-
securities to finance its deficit and both central banks are passive.
asset equilibrium would also be at point E if the UKCB sells U.S.
reserves and the U.K. purchases a GCR while the USCB employs a MCR.
would be reached if imbalances are financed by changes in outside
and the supply of U.K. securities remains unchanged. This point
Point A is the equilibrium point if the U.S. money supply
through A2.

Thus be represented by the shifts in either PP or BB from Pi at
are equal in amount to the sales of securities by the USCB and can
the UKCB is equal to the purchases of securities by the UKCB which
and the excess supply of money in the U.K. the loss of reserves by
necessary to remove the initial excess demand for money in the U.S.
Holdings of securities reflect changes in the two money supplies and changes in central bank reserve targets. The impact effects and constraint interaction on reserve changes which arise when the reserve changes are consistent with the interest on the balance of international reserves are illustrated in the second diagram. In the absence of international reserve holdings, in the absence of international reserve allocation, the constraint on the balance of international reserves is illustrated in the second diagram.

\[ \frac{\Delta M^i}{\Delta M^s} = \frac{\Delta R}{\Delta P} \]

and the shift in PP is given by:

\[ \frac{\Delta M^i}{\Delta M^s} - \frac{\Delta R}{\Delta P} \]

Given by:

The answer to this question is unimportant, the shift in PP is measured in the same way. An algebraic analysis reveals that the shift in PP is measured in the same way.

Footnote continued from previous page

It is important to note that the U.K. Central Bank does not have the power to control the interest rate and the money supply in the U.K. The U.K. Central Bank can only influence the interest rate and the money supply through monetary policy decisions. This is in contrast to the U.S. Central Bank, which has more direct control over the money supply and interest rates. The difference between the U.K. and U.S. monetary policies is due to the differences in the size and structure of their economies and the unique historical and political factors that have shaped their monetary systems.
The following: $A^1 > A^2 > A^3$. The techniques for ranking each 

ranking points from least to greatest, $u_k$. Reserve, loss, we obtain.

Thus $A^3$ since the $BB$ curve must shift down further to reach $A^2$. This 
to the conclusion that $A^2$ involves a larger $u_k$. Reserve, loss than 
stock is the same at $A^1$ and at $A^3$. The same line of argument leads 
position it would have if it passed through $A^3$. Since the $u^S$ money 
$A^3$ can also be represented by the shift in $BB$ from $BB_1$ to the 
constant. The $u^S$, Reserve, loss ($u^S$, reserve, gain) implied by points 
declines further while $U$KCD holdings of $u_k$, securities are still 
$U_k$. Reserve, loss is implied by point $A^3$ since the $U_k$, money supply 
the U$K$C$D$ holdings of $u_k$, securities remain fixed. An even greater 
reserve loss by the U$K$C$D$ since the U$K$C$D$ since the $U_k$, money supply declines while 
$U^S$, must not have vanished and reserves, point $A^1$ involves some 
money stock not the U$K$C$D$ holdings of $u^S$, securities has changed the 
looking at the balance sheet of the U$K$C$D$. Since neither the U$S$, 
was an equilibrium which involved no reserve loss for the U$K$C$D$ by 
either the U$S$ or the U$K$C$D$ balance sheet. We showed that point $A^4$ 
assessing the implications of each of the equilibrium positions for 
relative magnitude of U$K$C$D$ reserve losses depends crucially upon 
positions we have considered. The technique for assessing the 
magnitude of U$K$C$D$ reserve losses implied by some of the equilibrium 
The graphical analysis can be used to determine the relative 

U$S$B employs an INCPR and we will not consider this case. 
pursued a RSCP. The analysis is somewhat more difficult at the
In the four-skid figure in Figure II the corners of which are
called mixed money-security adjustment which lead to policies which
are combinations of the two pure adjustment mechanisms and less efficient
than more efficient and pure security adjustment alone. It is less efficient
than what pure security adjustment alone leads to point A in Figure II
adjustment. Pure money adjustment alone leads to point A in Figure II
and adjustment that is, to rely completely upon what we call pure security
adjustment. That is, to rely completely upon monetary supplies consistent and allow their holdings of securities to
keep what we call pure money adjustment, then for central banks to keep
and allow money supplies to change, that is, to rely completely upon
blitz for central banks to keep their holdings of securities consistent
primarily of which development is only one example. It is more efficient
than adjustment of which development is only one example but any shock to assets of agents.
Is shown in part II of the appendix that for any shock to assets of agents.
In this case, however, it can be proceeded after adjusting that the reserve
is not reduced 0 because the graphic technique is insufficient.

T have not taken 0 because the graphed technique is insufficient.

May have been shifted away from U.S. securities and in favor of U.K.

If a devaluation by the U.S. has been expected, asset demands
allowed to accommodate reserves.

Point of view and how conducted the N.D.B. is that the U.S. should be
upon whose policies the central banks depend. Appropriate from a domestic
the policy responses of the two central banks which in turn depend
adjustments due to the wealth effects of a devaluation depends upon
The magnitude of U.S. reserve gains from the portfolio
comparison allows us to determine how the third item must have changed.

Then compare the changes in another item between the two portfolios; this
bank on the other which remains unchanged between the two portfolios and
part of portfolios is to find an item on the balance sheet of one central
securities at some point before the devaluation. After the devaluation
that is, the demand for U.K. securities would rise at the expense of
the demand for U.S. securities. If this shift in asset demands
occurred B1 and F1 would shift further to the right than the positions
shown by B1 and F1 at the time of the devaluation. This increased
shift means that the size of the adjustments in the quantity
variables in the model required in order for equilibrium to be
re attained are larger. For any given combination of policy responses
by the U.S. and U.K. central banks, changes in stocks of money and securities
held by the U.S. and U.K. publics, and reserves held by the central
banks will be at least as large, in absolute value, as they would
have been without the additional shift in asset demands.

\[1\] Examples can be constructed to show that the same statement
cannot be made for the required changes in interest rates.
on demand deposits.

\[ r = \frac{a}{b} \]

It is assumed that banks do not pay explicit or implicit interest.

commercial reserve requirements. We assume that U.S. (U.K.) commercial banks must hold bank reserves equal to a constant fraction of their deposits.

In order to facilitate the analysis, we make several assumptions and modifications in the model we call "fractional reserve central banking." Between our description of fractional reserve commercial banking and what we call the U.S. or U.K. commercial banks, a new equilibrium is created, which allows for the possibility that the U.K. does not hold some of its international reserves. In the modified model, we are able to allow for the behavior of banks under some alternative assumptions about central bank behavior.

Intercountry disturbances in the model without fractional reserve are asset preferences in the modified model with the effects of an expectation shock in the banking system. In order to suggest what difference fractional reserve banking makes we compare and contrast the effects of a shock in fractional reserve commercial banking. We show how our model can be modified to incorporate a relatively simple description of fractional reserve commercial banking explored. We show how our model can be modified to incorporate a fractional reserve commercial banking system into the model.

In this chapter, some of the implications of introducing a
cellulars are binding. 

bank to the extent that the voluntary portfolio credit restriction (VPCR) 

\[ \frac{d}{dt} \left( \frac{1}{1+\frac{R}{S}} \right) + \frac{R}{1+\frac{R}{S}} \right) \]

\[ q^H = \left( \frac{d}{dt} \right) \left( \frac{1}{1+\frac{R}{S}} \right) \]

and the U.K. are given by:

The supplies of high powered money to the commercial banks in the U.S.

\[ \frac{d}{dt} \left( \frac{1}{1+\frac{R}{S}} \right) = q^H \]

\[ \frac{d}{dt} \left( \frac{1}{1+\frac{R}{S}} \right) = q^D \]

and commercial bank demand for securities in the U.S. and U.K.

\[ N^S = \frac{d}{dt} \left( \frac{1}{1+\frac{R}{S}} \right) \]

\[ N^D = \frac{d}{dt} \left( \frac{1}{1+\frac{R}{S}} \right) \]

are given by:

(b) and (b) respectively are given by:

and the money supplies available to the U.S. and U.K. publics, \( M^S \) and \( M^D \) 

\( H \) and \( D \), supplies of high powered money in the U.S. and the U.K. respectively. 

As many interest bearing securities as possible. This for any given deposit liabilities as much as possible in order to be able to hold 

countries are "fully loaded up," that is, that they expand their 

customary at this level of abstraction we assume that banks in both 

countries hold only domestically issued securities. As is 

there is no currency in the model, commercial banks in both 

the U.S. and U.K. publics are assumed to hold no high powered money. 

Reserves and bank reserves we call the latter "high powered money." 

UKB respectively. In order to avoid confusion between international 

the U.S. (\( H^S \)) and in the U.K. (\( H^D \)) are deposits at the USCB and the
both the \( M_p \) and \( D_p \) schedules (NN and PP schedules).

Casey's market equilibrium condition so that changes in \( p' \) shift the supply of high-powered money to commercial banks given by \( \text{bc} \) supply of high-powered money to commercial banks is decreasing. In analytical terms, the important modification which are independent. In analytical terms, the important condition on the sum of the four equations

equations together yields an identity, only three of the four equations are independent. In analytical terms, the important condition on the sum of the four equations

\[
M_{i,r,1}, m = \left[ \left( s + \left( h + c, \frac{r - h}{b}, d + \frac{r}{b} \right) \frac{\sigma}{\mu} \right) + \frac{r}{b} \right] m = \mu_u
\]

\[
M_{i,r,1}, m = M_{i,r,1}, m = \ \left( s + \left( h + c, \frac{r - h}{b}, d + \frac{r}{b} \right) \frac{\sigma}{\mu} \right) s
\]

\[
M_{i,r,1}, m + M_{i,r,1}, m = \left[ \left( s + \left( h + c, \frac{r - h}{b}, d + \frac{r}{b} \right) \frac{\sigma}{\mu} \right) + \frac{r}{b} \right] m = \mu_u
\]

\[
\left( s + \left( h + c, \frac{r - h}{b}, d + \frac{r}{b} \right) \frac{\sigma}{\mu} \right) s
\]

Given the assumptions above, we can rewrite the equilibrium conditions of the model in the following way.

\[
\text{bc} \ 	ext{represents \ the \ USCB \ and \ M_c \ represents \ the} \ \text{USCB \ deposits \ at \ the \ USCB \ and \ M_c} \ \text{represents} \ \text{USCB \ deposits \ at \ the \ USCB}.
\]

\text{bc} \ 	ext{represents \ the \ USCB \ and \ M_c \ represents \ the} \ \text{USCB \ deposits \ at \ the \ USCB \ and \ M_c} \ \text{represents} \ \text{USCB \ deposits \ at \ the \ USCB}.

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...
Banking system do not affect B & M.

Transactors. The assumption implies that all changes in the scale of the
transaction that affect shareholders assume that all new purchases in bank deposits are
smaller than in the previous case.

We assume throughout this chapter except in footnotes. We assume that V, U, and C. securities will be
supplied by their owners. The excess supply of money and the excess demand for U's. securities will be
support the excess demand for U's. securities, and on the other hand, we assume that C. securities are
not purchased by transactors. If the excess demand for C. securities is greater than the excess demand for
money, an excess supply of money, an excess demand for C. securities will be created. In such a case, the
public remains unchanged. Given the rise in W and our assumptions about
the demand for C. securities, the amount of C. securities available to the
public increases with the amount of securities available to the
public. Given the rise in W also rises by the same amount since the amount of money available to
the public increases with the amount of securities available to the
public.

If, on the other hand, we assume that public shareholders anticipate
interest on the C. securities, this dollarization is reversed in the usual way.

The alternative is that C. securities are purchased by C. shareholders, and the increase in reserves in the form of C. securities instead of reserves in the form of U's. securities. If the U CB holds its supply constant so that N remains the N at K, money

are similarly constant. If the U CB always access as to keep the U, K. money
same as without fractional reserve commercial banking. Recall that we
and forms of U CB Reserve holding that make the analogy essentially the
same as without fractional reserve commercial banking.

In Figure 12, first consider some combinations of responses by the U CB
shift in preferences, money, and the N from P0 to P1 and P2 and P3.

Away from U's. securities, and covered U's. securities. As before, this

commercial banks. If we take the case of a preference shift by the public
businesses, C.'s shift in asset preferences.

C. A Shift in Asset Preferences.
The magnitude of the reserve flow can be measured by the shift in P F from U.K. to U.S. reserves, because reserves flow toward the point at which there would be no change in interest rates. The point must lie below point A. The point at which the curve below No. 4, point a intersect, which must lie above No. B. Therefore, the BB and RP curves show the sterilization operation of the U.K. causes a left from B B. In addition, the increase in the supply of U.K. securities by the commercial banks shifts the BB curve up and to the right, while the sales of securities by the commercial banks shifts the MM curve up and to the left. The drop in the supply of high powered money will fall as the U.S. loses reserves. The drop in the U.S. commercial banking system causes it to sell of U.S. securities. The decrease in the supply of outside assets and the U.S. does not sterilize, then the form of outside reserves and the U.S. holds its reserve changes in the fractional reserve banking does not affect the conclusions. The size of the U.S. commercial banking system has not been changed in either of these cases, so the same result will hold if the U.K. holds its reserve as U.S. and the new equilibrium will be at 40. Money supplies in this situation the BB and RP curves will shift back.
commercial banks will decline unless the U.S. sterilizes purchases at the U.S. to the amount of high powered money available to U.S. deposits in the U.S.? First, if the U.S. holds reserves as deposits, what happens if the U.S. holds increased reserves as contractual process reduces the need for reserves to flow from the commercial banks rather than the U.S. The additional effect, like a contractual process, opens market operation but which emanates from noticeable an additional (multiple) contraction which acts, in the hands of the public, drops by an equal amount. Also, the reserves flow out the supply of high powered money, and therefore the money supply process can be conceptually separated into two parts, as reserves flow in the international reserves held by the U.S. The multiple contraction sterilization operations by the U.S., is positively related to changes to the change in U.S. high powered money which, in the absence of banking from other sectors of the world economy is positively related to previous paragraph is that the absorption of securities by the U.S. The important point to notice in the case described in the since P must shift further down from 4 to reach 2 than to reach 3. With a fractional reserve commercial banking system then without one that although the reserve flow is in the same direction it is smaller point 2, where BI and NO interest, is reached, we can conclude a MSR and there is no fractional reserve commercial banking system in Chapter II that if the U.S. pursues a CSR and the U.S. pursues P required to reach the new equilibrium position. It was shown
(Footnote continued on following page)

private wealth holders' portfolios change when the size of the commercial
portfolio changes. This case is more difficult to handle
that any increases in profits in the banking system is transitory.
assume that shareholders anticipate that any increase in profits in
as we have seen in footnote 2 on page 83 we could characterize
of fractional reserve commercial banking if bank shareholders anticipate
We have indicated how the model would behave with the introduction

\[ \text{equilibrium will be at } 42. \]

\[ 1 \]

by an amount equal to the increase in NKCB deposits and the new
counteract but the supply of deposits available to the public will decline
NKCB does not sterilize the U.S. commercial banking system will not
equal the reserve flow, and the equilibrium will be at 40. If the
securities purchased by the NKCB and the U.S. commercial banks will
without reducing the amount of deposits held by the public.
The U.S. commercial banks will buy enough to accommodate the NKCB
securities and supply high powered money so that total deposits at
open market operations. If the NKCB sterilizes it will purchase
public will decline unless the NKCB purges sterilizing expansionary
at U.S. commercial banks, the supply of deposits available to the
If the NKCB holds reserve changes in the form of deposits

flow and position 40 will be reestablished.
U.S. commercial banking system will not be affected by the Reserve
point 42 will be reached. If the NKCB instead sterilizes then the
securities increasing the supply of securities to the public, and
contraction, the contraction in the U.S. banking system will relax
securities. If the NKCB is passive then the U.S. banking system will

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curve between $a_1$ and $a_2$.

In contrast, the equilibrium position will be at some point on the NOx curve, the value of U.S. Available assets exceed the expected demand for U.S. securities, and U.K. securities, there is no increase in the supply of U.S. securities. The U.S. public's reaction to this increase is to reduce the amount of the expected increase in the supply of U.S. securities and sell U.K. securities. This process involves a decrease in the NSE's assets. Before this process is over, the money supply will contract as high-powered money decreases and the NSE's money supply is constant and that the NSE is passive. The U.K. keeps the U.K. money supply constant and that the NSE is passive. The U.K. curve before adjustment takes place, assume as before that the U.K. curve before adjustment takes place. In Figure 2 the P1 and P2 curves are the shifted security market. In Figure 3 the P3 and P4 curves are held by U.S. residents then the following will occur. U.S. bank stock is held by U.S. security market. U.S. securities are held with preyously and assume that all securities (including claims on banks) available for the privilege non-banking sector to hold remains unchanged. When the NSE remains passive a reserve loss leads to a reduction in which international reserves to monetary liabilities which is less than market operations it is wished to maintain a desired ratio of reserves by the NSE. Reserve ratios to maintain a desired ratio of international reserves to its central bank. Under this assumption a loss of international monetary liabilities, we call such behavior "fiscal reserve". So as to maintain a constant ratio of international reserves to its central bank, suppose that we refer to the model of Chapter II. The essence of fractional reserve banking without ever introducing the fractional reserve concept, A Note on "Fractional Reserve Central Banking"
Features of the problem under consideration.

As an intersector team without losing sight of any of the essential
and the commercial banking system and cancel our high powered money
under appropriate assumptions we can consolidate the central bank
in part 1 of the Appendix. It is important because it implies that
which they are explicitly included. We state and prove this proposition
commercial banks is exactly the same as the behavior of a model in
the behavior of a model which does not take explicit account of
assumptions we can specify central bank behavior in such a way that
one example of the more general proposition that under certain
deposit liabilities in the model of the current chapter. Thus it is the
chapter II is the same as the required ratio of high powered money to
ratio of international reserves to monetary liabilities in the model of
of the two models is exactly equivalent if the central bank’s decision
securities. Under the circumstances specified above the behavior
powered money which causes the commercial banks to sell off
An Introduction

Relative Economic Size

Dependence of Substitutability Between Securities and Upon the Effectiveness of Monetary Policy Upon the

VIII. The Dependence of the Effects of Monetary Policy Upon the

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assumptions explored for the ability of the USCB to control the U.S.

"rate" or an "aggregate". We sketch the implications of the
to whether the proximate target of monetary policy should be a
not intended to take a position here, either explicitly or implicitly,
this way only to avoid an unnecessary proliferation of cases. We do
USCB is met with a CSPI by the UKCB. We restrict our analysis in
supplies associated with reserve changes, that is, the CSPI by the
no attempt in either country to sterilize the effects of money
of the rate on U.S. securities. We usually assume that there is
U.S. securities and the rate on U.K. securities and upon the level
the policy instrument upon the differential between the rate on
is a CSPI by the USCB. Attention is focused upon the effects of
the USCB. In our terminology the policy action we are investigating
this chapter we mean an open market purchase of U.S. securities by
for the most part when we refer to monetary policy in
issued in the rest of the world.

in the small country are not perfect substitutes for those
relative to the rest of the world even if the securities issued
and a country which is small in economic size
our the special limitations on the effectiveness of monetary
perfect substitutes for one another. A third purpose is to spell
range in which U.S. and U.K. securities are substitutes but not
affect the effectiveness of monetary policy in the intermediate
which increases in the degree of substitutability between assets
In the money market and the market for securities issued at home, in the interest rate on securities issued at home must clear both only assets considered suitable for wealth holding, the same value since in each country money and securities issued at home are the \( \text{K} \) and \( \text{RP} \) schedules coincide as do the \( \text{K} \) and \( \text{RP} \) schedules. Holding is concerned these two economies are "closed" economies, either \( \text{K} \). securities or \( \text{K} \). money. So far as financial asset citizens do not consider \( \text{K} \). securities to be substitutes for citizens do not consider \( \text{K} \). securities for \( \text{K} \). securities or \( \text{K} \). money and \( \text{K} \). money and \( \text{K} \). money. In a situation in which \( \text{K} \). \( \text{K} \) citizens do not consider \( \text{K} \). securities for \( \text{K} \). securities or \( \text{K} \). money and \( \text{K} \). money and \( \text{K} \). money and \( \text{K} \). money, there are two important cases in which wealth holders in both countries regard the two of roughly equal economic size, we begin our discussion with the securities retaining the assumption that the \( \text{K} \). and the \( \text{K} \). are Regarding the degree of substitutability between \( \text{K} \). and \( \text{K} \). First we explore the implications of some polar assumptions

B. The Effects of Monetary Policy in Some Polar Cases

cannot control this rate, it cannot control the money stock either. this rate, it can also control the \( \text{K} \). money stock, and when it policy is of little consequence since when the USCB can control securities as an illustrative proximate target for \( \text{K} \). monetary

money supply, As we shall see, the choice of the rate on \( \text{K} \).
cases just discussed as a base case against which to measure the
decline by the amount of the decline in the U.S. rate. There are good arguments in favor of using each of the two
and the USCB loses reserves. Once again the interest differential
same reason the rise in the U.S. money stock is less than before, residents surrender some U.S. securities to the USCB. For the
smaller decline in the U.S. interest rate in this case because U.K.
previous case, an open market purchase of equal size causes a
of U.S. money demand to the U.S. rate is the same here as in the
the amount of the open market purchase. Of course, if the response
holdings of U.S. securities and increase their holdings of money by
enough to make both U.S. and U.K. residents willing to reduce their
purchase by the USCB causes the rate on U.S. securities to fall by
no longer counterparts with the BB (PP) schedule. Here an open market
completely non-substitutable for one another. The PM (NN) schedule
money even though the two types of securities are regarded as being
residents view both types of securities as substitutes for domestic
residents hold both types of securities and in which both groups of
Figure 13b portrays a situation in which U.S. and U.K.
amount of the decline in the U.S. rate.
differential between the U.S. and U.K. rate is reduced by the full
of money by the amount of the open market purchase. Of course, the
reduce their holdings of U.S. securities and increase their holdings
U.S. securities to fall by enough to make U.S. residents willing to
this case an open market purchase by the USCB causes the rate on
of the MM and NN schedules approach negative one as the two securities
of the two securities markets to remain in equilibrium. The slopes
offset by an almost identical increase in I in order for either
securities become virtually identical, any increase in I must be
shores of the BB and PF curves approach positive one, as the two
as the degree of asset substitutability increases without limit, the
perfect substitutability are supported by a mathematical argument later.

on the lower curves of allowing the two securities to become virtually
treat this case graphically. Some of our assertions about the effect
and U.K. securities are virtually perfect substitutables. First we
we turn now to the other polar case, the case in which U.S.

keep constant, the second case is a better base case.

ility between securities with as many other factors as possible
is focused more narrowly on the implications of increased substitutability-
case is a preferable base case. If, on the other hand, our concern
effects of the same policy in a large closed economy, the first
issued abroad as very good substitutables for home assets with the
policy in a large open economy in which wealth holders view assets
one hand, we are interested in contrasting the effect of monetary
should depend upon the question under consideration. If, on the
two types of securities. It seems that the base case one chooses
effects of increases in the degree of substitutability between the
with a slope of positive one which represents the DD and FF schedules.

MM and NN schedules are exactly alike when the two securities are exactly alike the
value of the securities one for one. The two securities were exactly
identical in every respect. A decline in X would lead to a decline in both
residences. The slopes of the MM and NN curves never actually take on the
value of negative one for X. The two schedules in Figure 14.

The positions of the four curves are shown by the BDP0 and D0/N0 and
the money demand responses of U.S. wealth holders. The limiting
nearly the same. We can make a similar case regarding changes in
of their money demand to the two interest rates should become very
view the two securities as being almost completely alike, the responses
become indistinguishable. Since wealth holders in, say, the U.S.

\[1\]
What is effectively one rate the larger the reduction in this rate
the sensitivity of the demands for money in the two countries to
must change in order for equilibrium to be reestablished. The lower
and the two types of money in the world so the world interest rate
market purchase alters perceptibly the relative supplies of securities.
The USCB can affect this change because a plausible view open
result which be that the USCB can lower the world interest rate.
effectively only one world rate, so a better way of stating the
perfect substitutes. Of course, in the limiting case there is
making an open market purchase even when securities are virtually
at $\frac{M}{N-2}$. The USCB can still lower the $\frac{U}{N}$ interest rate by
the $\frac{M}{N}$ curve shifts up and the $\frac{N}{U}$ curve shifts down until they meet
then its initial value, and the $\frac{U}{N}$, money supply rises. Graphically,

Immediately following the open market purchase but remaining higher
residents. The $\frac{U}{N}$, money supply elasticity can be lowered if assumed
market purchase, so they make net purchases of securities from $\frac{U}{N}$.
residents hold too much money and too few securities after the open
$\frac{U}{N}$ securities. However, the $\frac{M}{N}$ schedule is shifted to $\frac{U}{N}$.

Takes virtually no change in $r$ to remove a given excess demand for
leaves the BB/FF schedule unaffected in the limiting case since it
causes a massive change in security demands, an open market purchase
securities is that a small change in either of the two interest rates
the implications of very high degree of substitutability between
Now consider an open market purchase by the USCB. One of

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In order to make the problem demand responses to these same rates, it is necessary to assume that the ratio of U.K. money to the rate on U.S. securities is less than the ratio of U.S. money demand to the rate on U.K. securities. This rate response to the demand for U.S. securities, and hence the rate of the response of U.S. money demand to substitutability in the portfolios of wealth holders in each of the two securities, U.K. securities, and domestic money are strictly gross.

We have just completed up to this point and have assumed that U.S. percent substitutability is somewhat more difficult task than the one when securities are neither completely non-substitutable nor virtually substitutable between securities.

Substitutability: The impact of increases in the degree of substitutability on the effects of monetary policy in the general case.

Analyzing the impact of increases in the degree of substitutability on the effects of monetary policy in the general case.

In order for equilibrium to be maintained in the markets for securities, in t must be matched by an equal change in r, in the same direction move along a line with a slope of positive one, so that any change securities, so no such change can occur. In graphical terms we want to make an indeterminately large shift between U.S. and U.K. case, any change in the differential would lead wealth holders to purchase U.K. rates is unaffected by an open market purchase in the limit and we would expect the differential between the U.S. and the one obtained by other analysts. This result accords with setence upon the open market purchase. This result accords with

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First we assume that "own rate effects" are greater than "cross-rate effects" on the demand for securities by both U.S. and U.K. wealth holders. This assumption implies, for example, that the absolute value of the effect of a one percentage point rise in the U.S. rate (own rate) on the demand for U.S. securities by U.S. residents is greater than the absolute value of the effect of a one percentage point rise in the U.K. rate (cross rate) on the demand for U.S. securities by U.S. residents. The implications of the effects of interest rate changes on other security demands are analogous. Secondly, we assume that in each country the absolute value of the response of money demand to a one percentage point increase in the rate on securities issued abroad is less than the absolute value of the response of money demand to a one percentage point increase in the rate on securities issued at home. These two assumptions are similar to those made in the previous chapter. We assume also that the demand for gross substitutes is strictly positive and that the demand for money is strictly positive. These assumptions lead to the schedules shown in Figure 6a, which could occur under our earlier weaker assumptions are ruled out.

1/ See page 24 above.

2/ More explicitly, we assume the following: \( r > b, \quad b > f, \quad f > f' > f'' \).
In the manner we have outlined, the reader who is satisfied with the
explore below some assumptions which assure that the schedules behave
the schedules may not behave in the way we have suggested, we
changes in the schedules which we have described seem reasonable.
movements we have described are shown in Figure 16. While the
changes in the money demand response of U.K. wealth holders, the
should become more similar. We can make an analogous case regarding
alike, the responses of their money demand to the two interest rates
say, the U.S. come to view the two securities as being more and more
two securities become better substitutes, since wealth holders in
schedule should fall (rise) continuously toward negative one as the
It also seems reasonable to suppose that the slope of the MM (NN)
toward one as the degree of substitutability between assets increases.
suggests that the slope of the PP schedule should fall continuously
1) The degree of substitutability between assets is increasing. A similar argument
in P should be approaching equality with the rise in r, as the
appear to wealth holders in both countries and that the required rise
supply arising from an increase in r, the more alike the two securities
plausible that r should have to rise farther to remove the excess
schedule to increase continuously toward positive one. It seems
substitutability between assets should cause the slope of the PP
analyses. Intuition suggests that increases in the degree of
substitutability between U.S. and U.K. securities for our graphical
Now we must investigate the implications of increases in

- 100 -
Without limit as susceptibility increases, we regard all of the
are completely nonsusceptible and which these continuously
Let s be a variable which takes on the value zero when the two assets
increases in susceptibility between U, S, and U, K, securities.
and what we believe to be an intuitively appealing way to represent
increased susceptibility between securities we choose a common
which the schedules are affected in the way we have described by
In order to specify more exactly some conditions under

FIGURE 16


surrounding Figure 17.
demand responses to interest rate changes by U.S. and U.K. residents as functions of \( s \) and write them as, for example, \( b_r(s) \). We define three vectors \( \alpha(s) \), \( \beta(s) \), and \( \gamma(s) \),

\[
\begin{bmatrix}
\alpha(s) \\
\beta(s) \\
\gamma(s)
\end{bmatrix}
= 
\begin{bmatrix}
b_r(s) \\
b_t(s) \\
b_r(s)
\end{bmatrix}
= 
\begin{bmatrix}
m_r(s) \\
m_t(s) \\
n_r(s)
\end{bmatrix},
\]

\( \sigma(s) \) is a vector of own rate effects; \( \beta(s) \) is a vector of cross rate effects; \( \gamma(s) \) is a vector of money demand responses. From our earlier analysis we know that \( \sigma(s) + \beta(s) + \gamma(s) = 0 \). When the two securities are perfectly non-substitutable for one another we have \( \sigma(0) = -\gamma(0) \) and \( \beta(0) = 0 \). We assume that as the degree of substitutability increases the values of the cross rate effects decrease continuously without limit, and the values of the cross rate effects decrease continuously without limit.

\[
\begin{bmatrix}
\alpha(0) \\
\beta(0) \\
\gamma(0)
\end{bmatrix}
= 
\begin{bmatrix}
m_r(0) \\
0 \\
m_r(0)
\end{bmatrix},
\]

In the case in which the two securities are completely non-substitutable for one another and securities issued abroad are considered to be completely non-substitutable for domestic money by residents of both countries we have,
\[ \lim_{s \to 0} = \lim_{s \to 0} = \lim_{s \to 0} \]

For the interest rate responses of U.S. money demand, so we have,

value which lies between them as a limit. We make analogous assumptions

one another continuously and that these effects tend toward a common

the values of the interest rate responses of U.S. money demand approach.

Finally we assume that as the two securities become better substitutes

\[ 0 = (1 - \lambda_q) \frac{q}{q + 1} \]

\[ 0 = (1 - \lambda_q) \frac{p}{p + 1} \]

between them approaches zero as \( s \) increases.

Also we assume that the two cross effects on the security

\[ \bar{\omega} = \bar{\omega} = \bar{\omega} \]

\[ \bar{\omega} = \bar{\omega} = \bar{\omega} \]

\[ \bar{\omega} = \bar{\omega} = \bar{\omega} \]

\[ \bar{\omega} = \bar{\omega} = \bar{\omega} \]
Cross effects as follows:

Using the implications of the two balance sheet constraints and a
Little manipulation we can write the four sums of own effects and
all four ratios approach positive one as approaches infinity.

The assumptions we have made up to this point insure that
for a particular security and for a single determinable behavior

\[ \frac{r_{12}}{r_{11}}, \frac{r_{13}}{r_{11}}, \frac{r_{14}}{r_{13}}, \frac{r_{14}}{r_{14}} \]


guarantees a cross effect displayed by an own effect or vice versa.

Limit depends crucially upon what happens to four ratios:

responses of the security demands increase and decrease without
shall we, what happens to the BB and FF curves as the interest rate
substitutability increases is somewhat more complicated, as we

The analysis of what happens to the BB and FF curves as

That is to say, substitutability increases.

negative and approaches negative one as a limit as the degree of
limit and the slope of the MM curve becomes continuously less
becomes continuously more negative and approaches negative one as a
responses are sufficient to insure that the slope of the MM curve

We leave this issue open for the present.

securities to be more like domestic securities in both countries,
as arising from changes which make wealth holders consider foreign
decline to equal them as characterized increases in substitutability

\[ m, n, m, n, m, n \]

\[ m, n, m, n, m, n \]

where \( m, n \leq m, n \) and \( n > k, m \) and \( n > k, m \).

It could be argued that

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Subject to intermediate ranges without it. Apparent that little progress can be made in the analysis of increased pressure that this assumption holds in what follows. It will be for, since the substructurability between securities increases, we can expect each effect arise effects become continuous, more alike except continuously toward positive one. This assumption states simply that $r_i \frac{\partial}{\partial r_j} - r_j \frac{\partial}{\partial r_j}$, and that $r_i \frac{\partial}{\partial p} - r_j \frac{\partial}{\partial p}$, these constants well include the added assumption that $r_i \frac{\partial}{\partial p}$, and $r_j \frac{\partial}{\partial p}$, a plausible characterization of increases in substructurability could point have no decisive implications for this situation. In our view s is increased in intermediate range, but our assumptions up to this point need to know what happens to these four ratios as.

Four ratios approach positive one as s approaches infinity, numerator and denominator of each ratio approaches a constant, all increasing or decreasing without limit and since the sum of the numerators and denominators of each of the four ratios are either all of these sums approach constants as s approaches infinity. Since infinity, so given our assumptions regarding money demand responses, we have assumed that the terms in brackets approach zero as s approaches

\[
\begin{align*}
&\left[1 + \frac{1}{q}\right] + \frac{1}{u} - \equiv 1 + \frac{1}{q} \\
&\left[1 + \frac{2}{q}\right] + \frac{1}{u} - \equiv 1 + \frac{2}{q} \\
&\left[1 + \frac{3}{q}\right] + \frac{1}{u} - \equiv 1 + \frac{3}{q} \\
&\left[1 + \frac{4}{q}\right] + \frac{1}{u} - \equiv 1 + \frac{4}{q}
\end{align*}
\]
differentiating the expression for the slope of the BB curve we have,

\[ \frac{dBB}{dp} \mid_{p=q} \]

and

\[ \frac{dBB}{dp} \mid_{p=q} \]

are approximations to the change in the ratio of the demand responses of the country in question to a change in the U.S. interest rate. Each weight is the ratio of the demand response of the United States to accomplish the same effect in the U.K. to the change in the U.K. interest rate. In order to keep demand for U.S. securities constant in the U.S., the change in the U.K. interest rate is required to offset a change in the slope of the BB curve. The slope of the BB curve is given by

\[ \frac{dBB}{dp} \mid_{p=q} \]

We are now prepared to investigate the behavior of the BB and PP schedules as the degree of substitutability is increased.
Thus the possibility of a "perverse" movement in the slope of the BB is zero if the two coutertries are exactly alike in either or both respects, and in terms of per cent changes in own effects and that it are the two coutertries either in terms of the ratios of the rates of cross effects to whatever its sign, it is smaller in absolute value the more alike third term in the expression. What we can say, however, is that, we have found no contradicting argument to determine the sign of the on the larger of the two terms tends to rise (fall) on the larger of the two terms tends to rise (fall) if the weight the per cent increase in \( p \) is greater (less) than the per cent increase in \( p \) weights do not. In general, remain constant. In this case, the weight constant the weighted average depends on the right hand side are positive, that is, with the weights both coutertries is sufficient to insure that the first two terms on race effects on the demand for U.S. securities become more alike in be the case. Our earlier assumption that own rate effects and cross increases should be positive, however, this need not necessarily the expression for the change in the slope of the BB schedules as we have suggested above that intuition would lead us to believe that

\[
\mathbf{s}_{1m} \left( \frac{1}{\mathbf{q}} - \frac{1}{\mathbf{q}} \right) + \frac{\mathbf{s}_p}{\left[ \left( \frac{1}{\mathbf{q}} \right) \right]^p} \left( \mathbf{l}_{m-1} \right) + \frac{\mathbf{s}_p}{\left[ \left( \frac{1}{\mathbf{q}} \right) \right]^p} \mathbf{l}_m = \frac{\mathbf{s}_p}{\left( \mathbf{q} \right) \left( \frac{1}{\mathbf{p}} \right)^p}
\]

where
If the two countries are similar enough, the third term may be of either sign but the whole expression is positive. The first two terms are positive under our earlier assumptions. 

\[
\left( \frac{x_{1,j} - x_{1,j}}{s_{1,j}} \right) \times \frac{Z_{1,1} (x_{1,j} + M_{1,j})}{M_{1,j}} = Z_{m}^{*}
\]

where

\[
Z_{m}^{*} \left( \frac{1}{x_{1,j} - x_{1,j}} \right) + \frac{sp}{x_{1,j}} (Z_{m-1}) + \frac{sp}{x_{1,j}} \left( \frac{1}{x_{1,j} - x_{1,j}} \right) p = Z_{m}^{*} \left( \frac{1}{x_{1,j} - x_{1,j}} \right) \]

which can be rewritten as

\[
\frac{M_{1,j} + M_{1,j}}{M_{1,j}} = Z_{m}
\]

where

\[
\left( \frac{x_{1,j} - x_{1,j}}{s_{1,j}} \right) (Z_{m-1}) + \left( \frac{x_{1,j} - x_{1,j}}{s_{1,j}} \right) p = \frac{dd}{x_{1,j} - x_{1,j}} \left( \frac{1}{x_{1,j} - x_{1,j}} \right)
\]

unimportant in a two country world.

It seems somewhat less natural to assume that such distribution effects are "distribution effects" which are usually assumed away. It seems that these effects, like those above, might be due to economic shocks. For example, shocks to the demand schedules for two types of securities and money. In short, a two country world would arise if we were analyzing a closed economy, whereas the two well defined groups of wealth holders with different economic shocks, for example, might be due to distribution effects. A similar problem would arise if we were analyzing a closed economy with two well defined groups of wealth holders with different economic shocks. In short, a two country world would arise if we were analyzing a closed economy, whereas the two well defined groups of wealth holders with different economic shocks. A similar problem would arise if we were analyzing a closed economy, whereas the two well defined groups of wealth holders with different economic shocks. A similar problem would arise if we were analyzing a closed economy, whereas the two well defined groups of wealth holders with different economic shocks.
rata equilibrium in the market for U.\'s, securities. I must fall if I
once the USG has made the open market purchase, but in order to main-
flate than \( P_0 \). We know that I must fall to reestablish equilibrium
and U.'s rates. This result follows simply from the fact that \( P_0 \) is
always less than \( P_0 ' \). The rate of a reduction in the differential between the U.'s,
subjects' less of a reduction in the differential than the U.'s.
Subjects. It is clear from both diagrams that an increase in
subjects' takes a smaller change in \( P_0 ' \) to remove a given excess demand for U.'s.

\( b_0 \) and \( b_1^p \) in both diagrams; as \( b_0 \) increases, it
the distance between \( b_0 ' \) and \( b_1^p ' \) is less than the distance between
the \( b_0 ' \), \( b_1^p ' \), and \( P_0 ' \) schedules. Note that for a given value of \( r_0 ' \),
higher degree of substitutability between the two securities than
Figures 1a and 1b. The \( b_0 ' \), \( b_1^p ' \), and \( P_0 ' \) schedules represent a
increase in \( b_0 \) and \( b_1^p \) can be seen in
improvements of an increase in substitutability for the effects of
U.'s. Rate must be greater than the deccine in the U.'s rate. The
PP curve has a slope which is greater than one, the decline in the
rates. The BB schedule is shifted down from \( b_0 ' \) to \( b_1^p ' \). Since the
case an open market purchase reduces both the U.'s and U.'s.
interest
complete. By reference to Figure 17 we can see that in the General
U.'s, interest rate and on the level of the U.'s rate is finally
higher in the degree of substitutability for the effects of an open
market purchase by the USG on the differential between the U.'s and
increases in the degree of substitutability of the implications of
The groundwork for our consideration of the implications of

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falls. As substitutability is increased each decrease in $r$ must be matched by a larger decrease in $r'$ if equilibrium is to be maintained in the market for U.K. securities.

Determining the implications of increased substitutability for the effect on the level of the U.S. rate of an open market purchase by the USCB is more difficult. Although we can spell out the countervailing tendencies which lead to the ambiguity, we have been unable to arrive at a determinate result. Comparing Figures 18a and 18b we see that in the first case increased substitutability has caused an open market purchase to lead to a smaller reduction in $r$. 
and B are rotation means that a larger decrease in R is required
for U of S. Securities for a given value of R, the fact that both
are required to remove a given amount of excess demand in the market
shift in the BB schedule is reduced is that smaller reductions in R
The economic interpretation of the fact that the demanded
market purchase
leads to a reduction in the amount by which R falls after an open
schedule. The more likely it is that an increase in substitutability
schedule the smaller the amount of rotation of either the BB or PP
we have not shown, reveals that for a given downward shift in the BB
after an open market purchase. Experimentation with the graph, which
substitutability leads to a reduction in the amount by which R falls
shift in the BB schedule is the more likely it is that an increase in
of the BB and PP schedules the greater the reduction in the demanded
is greater than in Figure 1B. Clearly for a given amount of rotation
identical except that in Figure 1B the distance between B'O' and B'
we have drawn Figures 1B and 1B so that they are completely

the USCB to be reduced.

shift in the BB schedule resulting from an open market purchase by
a slope of positive one, and for a given r, it causes the demanded
important here. It causes both BB and PP to rotate toward a line with
substitutability has two kinds of effects on the schedules which are
an open market purchase to lead to a larger reduction in R, increased
and that in the second case increased substitutability has caused

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possible we must also assume \( m = M \).

regarding the interest rate responses of money demand functions as

are to assume that countering is identical to the sense described

restrictions imposed by our interpretation of what it means for countert

restrictions required by our interpretation of what it means for countert

money demands in the two countries to interest rate changes.

noncompatible with our earlier assumption regarding the response of
demands to interest rate changes are identical in the two countries in

to become less negative, the assumption that the response of asset

\( \frac{dx}{dt} \) a rise in the

\( \frac{1}{t} \) when the two countries are exactly identical in terms of the

structure, not nearly perfectly substitutable.

By the USCC when the two securities are neither completely non-sub-
in the US's interest rate caused by a given change in open market purchase

in the USA, securities cause a decline in the reduction

leave open the question as to whether or not an increase in sub-
dominate the other except in one very special case. Thus we must

have not been able to determine whether or not one of these tenden

the required decrease in r following the open market purchase, we

induced effect (rotation of the PP and BB schedules) tends to raise
decrease in r following the open market purchase while the increase
declines for U.S. security leaves the required decrease in r on the deman

declines direct effect (reduced demand shift in BB) of a decline

of any decline in r on the market for U.K. securities, the

to offset the effect of a given decrease in r on the market for U.K.
but we can say something. Firstly, we must ask whether or not a given effect of an open market purchase of the level of the U.S. rate decreases increases in substitutability upon the case of the impact of increases in the same kind of simple summary if, of course, not possible.

**Figure 19**

 caused by an open market purchase as a increases.

continuous decreases in the reduction in the interest differential.

Figure 19. No matter which base case we begin from there is a differential between U.S. and the U.K. rate are summarized in the substitutability upon the effect of an open market purchase on the our conclusions regarding the impacts of increases in

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\[
\frac{M(0)^2}{1} = \frac{M(0)^2q}{1} = \frac{\text{pc}}{\text{dp}}
\]

expression is

as being completely nonsubsistutable for money initially this

\[\frac{2}{\text{when wealth holders in each country regard foreign securities}}\]

notes.

even securities as being completely nonsubsistutable for money in core-

nonsubsistutable and in which wealth holders in each country regard for-

virtually perfectly substites with the case in which they are completely

virtually perfectly substites with the case in which the securities are

\[\text{in we handle the comparison of the case in which the securities are}
\]

\[
\frac{M(0)^2}{1} + \frac{m(0)^2}{1} = \frac{\text{dp}}{\text{dp}}
\]

as we have seen above the U.S. rate must fall by enough to induce

open market purchase on the U.S. rate is given by

\[
\frac{M(0)^2}{1} = \frac{M(0)^2q + M(0)^2q}{1} = \frac{\text{dp}}{\text{dp}}
\]

or an open market purchase on the U.S. rate is given by

another but are both somewhat substites with money. When the

\[\text{when the two securities are perfectly non-subsistutable for one}
\]

\[\text{when the two securities are virtually perfect substites than}
\]

open market purchase is less effective in lowering the U.S. interest
demand sensitivities would change in this way as they came to regard

It is plausible put by no means necessary that wealth holders money
the same movement out of money into bonds taken together in both countries.

that if, i.e. if a percentage point rise in both rates always caused
such a way that the sum \( M^2 \) (Remained constant,
and \( M^2 \) and \( M^2 \) became continuously more negative as increased in
such simple average \( M^2 \) would be
average \( M^2 \) and \( M^2 \) and \( M^2 \) (0) \( \bar{X} \), \( \bar{X} \), \( \bar{X} \) is such a simple
the simple average of \( M^2 \) and \( M^2 \) and \( M^2 \) is \( \bar{X} \) is met. For example, if \( \bar{X} \) conditio
condition may or may not be met. We can certainly find plausible

Given the set of assumptions we have made up to this time this

\[
|m(0)^2| < |(m(0)^2 + m(0)^2)|
\]

substitutes it and only if,

purchase is less when the two securities are virtually perfect

The reduction in the U.S. interest rate following an open market
U.S. securities and replace them with money in their portfolios.
in both the U.S. and U.K. rates induce wealth holders to surrender
both \( m^2 \) and \( m^2 \) as approaches infinity. In this case decreases
the limiting value of both \( m^2 \) and \( m^2 \) and \( m^2 \) is the limiting value of
\( (0)^2 \) \( n^2 \) \( (0)^2 \) \( n^2 \) \( (0)^2 \) \( n^2 \) where \( (0)^2 \) above \( m^2 \) and \( m^2 \) and \( m^2 \)
Figure 20

The information is summarized in Figure 20 in which three possible versions of what happens to $\frac{dP}{dt}$ as $s$ is increased are shown.

Neither virtually perfect substitutes nor completely non-substitutable substitutability is increased in the range where securities are purchased becomes continuously less effective as the degree of description above. We cannot establish that a given open market non-substitutable we are still left with the fundamental ambiguity of securities are perfect substitutes than when they are completely open market purchase is less effective in reducing $r$ when the two even if we are prepared to presume that a given stated of the conditions given above, but we do not explore them here.

Less restrictive assumptions which would lead to the fulfillment of the two securities as better substitutes. There are, of course,
D. Relative Economic Size and the Effects of Monetary Policy

In this section, we explore the implications of the assumption that the U.S. is a "small country" in the sense that its economic size as measured by nominal wealth is small in dollar terms. We begin this section with a consideration of the case in which U.S. and U.K. securities are perfect substitutes in order to show that our model yields the familiar result that a small country can affect neither the single world interest rate nor the size of its own money supply by a plausible sized open market purchase. Later in the section, we relax the assumption that U.S. and U.K. securities are perfect substitutes in order to demonstrate that a small country may well be unable to affect either of the two world interest rates or the size of its own money supply by a plausible sized open market purchase in this more general case.

Consider first the perfect substitutes case shown in Figure 21. As we argued in the last section an open market purchase by the USCB leaves the B0F0/F0 schedule unaffected and shifts the DM schedule from M0D0/N0D0 to M1. Following the open market purchase U.S. residents...
To reduce their holdings of securities and increase their holdings of
limit no decline in the world interest rate will induce U.K. residents
U.K. is large relative to the U.S. a very small decline and in the
purchase. To understand this conclusion we must realize that since the
and the U.K. money supply increases by the amount of the open market
rate and the U.S. money stock are unchanged; U.S. reserves decrease
the point at which W0W0 00. The world interest
curve does not move from W0W0 00, so the final equilibrium point is
shifts up but when the U.S. is small relative to the U.K. the NN
make net purchases of securities from U.K. residents. The NN curve
hold more money and fewer securities than they want to hold, so they

Figure 21
It is assumed here that the UKCB holds all its reserves in the form of outside reserves.

Substituting for $P$ in the balance sheet identity for the USCB we get

$\pi = e, \frac{e}{m}, \pi$

and

$\pi = e, \frac{e}{m}, \pi$

so we have

the ratio of central bank held securities to wealth is independent of wealth factors as possible held constant we assume that in both countries the wealth stock is a single world interest rate.

The n.s. money stock is

$M + R + S$

which is assumed to remain constant, so $M = \pi$ is set equal to $\pi$, which is the nominal value of world wealth.

The U.K. citizens wish to hold in the form of money as a function of the wealth which earlier discussions, $N_s$, $P$, $R$, $S$, we have the same interpretation as in our paper, $M = \pi$. We can then write down the equilibrium condition for this market in the UK, money market.

The equilibrium condition for this market in the UK, money market.

Our conclusion can be demonstrated formally by an analysis of a plausibility of U.S. residents to reallocate their portfolios following a plausible money by the relatively small amount necessary to satisfy the desires of
condition is differentiated.

Contrary to the case of a perfectly elastic, open market purchase, the rate of change of the equilibrium condition is changed when the equilibrium conditions are held constant. In the two cases of interest, there must be a decline in $r$. In contrast to the case in which the two market purchases are to be induced to hold this increase at a fixed $r$, there is a case in which the market purchase is to shift the $r$ schedule from $M_0$ to $M_1$.

The initial effect of an open market purchase is shown in figure 22. The initial effect of an open market purchase is shown in figure 22. The initial effect of an open market purchase is shown in figure 22. The initial effect of an open market purchase is shown in figure 22. The initial effect of an open market purchase is shown in figure 22. The initial effect of an open market purchase is shown in figure 22. The initial effect of an open market purchase is shown in figure 22. The initial effect of an open market purchase is shown in figure 22.

Thus, the expression approaches zero continuously as $M$ approaches zero. Thus,

$$
\left( M - \frac{M}{M} \right) \frac{\partial P}{\partial P} = eW = eW \\
\left( M - \frac{M}{M} \right) \frac{\partial P}{\partial P} = eW = eW
$$

Equating we obtain

$$
\frac{\partial P}{\partial P}
$$

Substituting in the expression above for $dP$ and

equilibrium condition. Substituting in the expression above for $dP$ and

equilibrium condition.

Given that the U.S. money stock remains constant after an open market purchase, the change in $r$ is constant with equilibrium in the U.K. money market.

The change in $r$ is constant with equilibrium in the U.K. money market.

$$
dP = - \frac{\partial P}{\partial P}
$$

open market purchase we must have.

See that if the U.S. money stock is to remain constant following an

- 121 -
BB schedule unaffected when the U.S. is a small country. The equilibrium conditions in the market for U.S. securities is,

\[(1 - \epsilon)W = b(r, x)\bar{W} + b'(x, r') (\bar{W} - W)\]

where \(\bar{W}\) has the same interpretation as in our previous discussion and \(\epsilon\) is ratio of U.S. securities held by the USCB to U.S. wealth. As before we assume that \(\epsilon\) is independent of the level of U.S. wealth and that open market purchases by the USCB are represented by increases in \(r\). Totally differentiating the equilibrium condition for U.S. securities and rearranging we arrive at the expression for the change in \(r\) required to offset a rise in \(\epsilon\) given a fixed \(r\).
as we determine in general, and we leave this
whether or not the absolute value of
\[ \frac{dp}{dt} \] 

holders would be prepared to hold no U.S. securities in their portfolios.

\[ \int \]

is, only if there were no finite r and r parts at which U.K. wealth
an indispensable asset in the portfolios of U.K. wealth holders, that
would approach zero as W approaches zero only if U.S. securities were
\[ \frac{r}{T} \]

from an open market purchase so long as \( q \) remains finite.

the negligible decrease in the supply of U.S. securities resulting

to induce the fall in U.K. demand for securities necessary to offset

W approaches zero. In the limit it takes a negligible decrease in W
value of this decrease remains finite so long as \( q \) remains finite as
by U.K. residents caused by a decline in \( r \). The absolute

of negligible size. The decrease in demand for U.S. securities

The absolute value of this decrease approaches zero as the U.S. becomes

private wealth holders resulting from an open market purchase is

forward. The decrease in the supply of U.S. securities available to

The economic interpretation of this result is straightforward.

This expression approaches zero as W approaches zero unless \( q \) also

\[ \frac{(M - M_q^r)q + M^r_q}{M} = \frac{d}{dp} \]

- 123 -
world's wealth holders.

These securities are not regarded as indispensable assets by the
substitutes for those issued in the rest of the world provided that
an open market purchase even if its securities are not perfect
securities issued in the country nor its country's money supply by
in a small country is able to affect neither the interest rate on
the full amount of the open market purchase. Thus the central bank
pre-open-market-purchase level. The U.S. loses reserves equal to its
securities from U.K. residents. The U.S. money supply returns to its
as U.S. citizens replace their portfolio by making net purchases of
two interest rates are unchanged. The Mr. curve shifts back to M^0.
Returning to Figure 22 we see that if the BB schedule is
would be required, but we will not treat this case here.

If U.S. securities were indispensable assets, further analysis
more general areas of concern. Constructive insights can be

drawn from the standpoint that all three of these cap-

tal accounts of the balance of payments in the short run, but
deals exclusively with the determinants of the balance on the portfolio

money as determinants of the overall balance of payments. Our model

which emphasizes the role of changes in the supply of and demand for

the "monetarist" approach to balance of payments analysis, an approach

Third, we compare and contrast our portfolio balance analysis with

the Lipton is retested after a disturbance except in extreme cases.

dissegmentation system. However, in our model capital account equal-
current world payments arrangements may constitute an international

rates may leave the world economy without an adjustment mechanism

argued that the mode of operation of monetary authorities in recent

regarding the international adjustment mechanisms. Robert Mundell has

pollcy actions. Secondiy, we draw some implications from our

it provides a useful framework for highlighting the similarities among

of alternative policy actions under different institutional arrangements.

emphasize the fact that while our model can be used to study a variety

approach for those separate areas of concern are stressed. First, we

specific results obtained in earlier chapters. The lessons of the

general properties of our approach rather than to a summary of the

This final chapter is devoted to a discussion of some of the

A. An Overview

VIII. Conclusions

- 125 -
or a deposit at a central bank.

So we assume that all money is either currency

or deposits at a central bank.

To simplify the discussion we assume that all money is either currency

or deposits at a central bank. This makes no difference in terms of economic impact which central banks

are subject to. Of course, central banks are limited

in affecting the supply of assets available for the public to hold. Of course, central banks are limited

in affecting the supply of monetary instruments. By their balance sheet constraints, since

supplies of the two kinds of money and of the two types of securities

influence the desired holdings of assets by private wealth holders, the

four magnitudes under the direct control of the two central banks,

which are a similar kind of result emerge from our model. There are

change rates change of a given amount.

subject to which has the same economic effect on trade flows as an ex-

sextant. A demonstration that there exists a certain pattern of trade taxes and

a familiar example of such an application of analytical economics is the

economic impact that is, to be, in effect, the same policy action.

A sequence of actions taken is different can be shown to have equivalent

the identity of the institutional actors is different or because the

actions which on the face of things seem quite different or because the

policies, one outcome of this type of activity is that policy

policy actions and to focus attention upon the economic impact of the

cut through the institutional details surrounding a particular set of

one of the primary purposes of analytical economics is to

B. The Economic Impact of Policy Actions

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Consider an initial disequilibrium caused by a shift in wealth holders. Different are really the same from the point of view of economic impact. Policy responses to a given initial disequilibrium which are superficially

The same kind of argument can be used to demonstrate that two

same given the policy responses of the two central banks.

UKG initiatives are identical to proactive measures in any market purchase while if the

interest rates such an action we call it an open market purchase while if the

bank which caused the original shift is of no consequence. If the USAB

policy responses of the two central banks. The identity of the central

equilibrium position will be naturally determined by the pattern of

to the left of the original PP and the new MM schedules. The new

intersection of the original PP and the new MM schedules lies above and

This action will shift both the MM and the DD curve down so that the

U.S. securities with U.S. money in a transaction within the private sector.

Suppose we are informed that some central bank has purchased

of money and two kinds of securities to the public.

actions is the net effect of the actions on supplies of the two kinds

steps. All that is important for tracing the economic impact of the

may be the result of a chain of actions consisting of several intermediate

holdings. It is also important to recognize that a given initial shift

results in the same change in equilibrium interest rates and asset

initial shift in asset supplies, no matter how it is accomplished.

long as the policy responses of the central banks are specified, a given
Mundell argued that if the monetary authorities allow deficits (surpluses) to contract (expand) the money supply, these deficits will set in macroeconomic systems, using a model of the short run IS-LM variety. Questions to Robert Mundell's model of what he called the international automatic mechanism. An important contribution to the debate on these issues is that policy-making authorities can successfully frustrate such an outcome, leading to either elimination or with the composition of monetary or fiscal policy.

C. Some comments on balance of payments adjustment mechanisms. Sterilize the U.K. money supply of outside assets and the U.S. pursuing open market operations to perform the operations with the UKQD accumulation reserve in the form of Sterling reserves. The UKQD performs both operations. It makes no difference whether the UKQD performs both operations. This knowledge is sufficient to determine the new equilibrium position. The central bank uses of these dollars to purchase U.S. securities. This resolved by central bank sales of pounds for dollars compared with preferences in favor of U.K. securities and away from U.S. securities.
the standard IS-LM framework,

affects some analysts and the functioning of government budget deficits in
results depicted in the last. A similar type of insolvency also

holders' behavior that allows portfolio to arrive at the monetary
the interest rate is lowered. It is thus assumed insolvency in wealth
which holders will accept more real balances at a given income only if
wealth holders constitute with more usual portfolio-balancing behavior.
function to the familiar liquidity trap. However, Mundell's money demand
effect to the familiar liquidity trap, which is analogous to
are in such a market be called a "securities trap" which is analogous to
constant interest rates without altering the behavior. Wealth holders
consistent with the assumption that wealth holders are in a constant and finite net capital. It also means that one
money supplied matter.

Although our short run portfolio balance model is not
deficit (surplus), for Mundell security supplies do not matter? only
without setting in motion any forces leading to the removal of the
could take place without any change in interest rates and therefore
available for the public to hold. In Mundell's model, this process
(sales) which reduce (increase) the quantity of domestic securities
(surplus) a country must continually undertake open market purchases
that in order to sterilize the money supply in the face of a deficit
when Mundell failed to account for adequacy in the face
imbalances from a balance of payments point of view.

no matter what is happening to the balance of payments is a disadvantage
see the value of the money supply in accordance with domestic objectives
persecute sterilization. Thus a system in which monetary authorities
effects of payments imbalances on the money supply, these imbalances
of securities cannot be thwarted by purchases of the two kinds of money supplied in both countries. With the same slope, sterilization money supplied since the total supply of securities outstanding remains unchanged. If the MM and NN curves have the same slope, sterilization cannot be reached when both countries sterilize their total supply of securities held constant. If a different interest rate is paid in both countries, sterilization is still possible when the two types of securities are perfect substitutes so that changes in relative supplies of securities with the same interest rate. In the preference of U.S. wealth holders in favor of U.S. money and controls indirectly the adjustment process in two cases: Consider a shift in our model sterilization of the domestic money supply in both cases, and suppose some parameter change causes the MM and NN curve to intersect at a different interest rate than the 1/1 in our model sterilization of the domestic money supply in both countries. Suppose some parameter change causes the MM and NN curves to intersect at a different interest rate than the two important cases. Suppose some parameter change causes the MM and NN curves to intersect at a different interest rate than the two important cases. Suppose some parameter change causes the MM and NN curves to intersect at a different interest rate than the two important cases. Suppose some parameter change causes the MM and NN curves to intersect at a different interest rate than the two important cases.
one at which the BB and FF curves intersect. If the one hand
central banks accept passively whatever changes occur in their money
supplies, that is, if they pursue what we have called CSPR, the new
equilibrium is given by the intersection of the BB and FF schedules
and money supplies adjust so as to satisfy money demands at the interest
rate pair given by this intersection. Adjustment is accomplished
through what we call a pure money adjustment mechanism. If on
the other hand, both central banks sterilize their money supplies, that is,
if they pursue what we have called a MSCPR, the new equilibrium is
given by the intersection of the MM and NN schedules and security
supplies are changed through open market operations by the two central
banks so they satisfy security demands at the interest rate pair
given by this intersection. Adjustment is accomplished through what
we call a pure security adjustment mechanism. Combinations of these
two pure adjustment mechanisms as well as what we call a mixed money-
security adjustment mechanism are also possible. Whatever the exact
mechanism, it is not in general possible for monetary authorities to
inhibit the adjustment process.

We have shown rigorously that there is an automatic mechanism
which shuts off any flow deficit or surplus on portfolio capital account.
In order to obtain results which are strictly comparable to Mundell's we
would have to imbued our two country portfolio balance model in a larger
model such as whether or not the labor supply is allowed to grow
and whether or not technical progress is incorporated would also be
1/ For rigorous definitions of pure money adjustment, pure security
adjustment, and mixed money-security adjustment and a discussion of
some of the implications of varying on each of the different adjust-
ment mechanisms or combinations of them see Part II of the Appendix.
1/ See Mekkinon (1969)

condition for equilibrium in, for example, the U.S. money market, is the money market is always in equilibrium. In terms of our model, the monetarist approach. This approach is founded on the assumption that the demand for and supply of money, this approach has been called the approach to balance of payments analysis, which focuses upon changes in the definitions. Some theorists have used this insight to develop a new money supply of an open economy is balance of payments surpluses as we have seen one cause of increases (decreases) in the money and net international movements of financial capital of money and net international movements of financial capital, the relationship between changes in the demand for and supply approach.

portfolio balance considerations which have formed the basis of our mechanism; but it is clear that it is important to account for the for further research into the nature of the international adjustment holders have their desired wealth levels. Certainly, these are needed consumption expenditure equal disposable income; that is, wealth long enough that one of the requirements for equilibrium is that a crucial feature of Mekkinon's model is that it refers to a period is also expenditure a budget deficit (surplus) of the same amount.

monetary authorities sterilize the money supply unless the country continuing balance of payments deficit (surplus) even when the technical progress Mekkinon has found that a country cannot have a variable but in which there is no growth in the labor force and no the interest rate, output, and the capital stock are endogenous important. In a portfolio balance model of an open economy in which
We assume that $S$ is held constant.

Equilibrium condition to be transformed into a theory of the balance of payments for the monetarist's viewpoint of the money market.

Money market equilibrium

Securities taken together by U.S. residents required to reestablish the same thing as that by dr represent the net change in holdings of all securities purchased from U.S. residents or sold by U.S. residents to nonresidents regardless of the country in which the securities were originally issued. Another way of saying it is that the excess of securities purchased from U.S. residents over those sold by U.S. residents is the capital inflow, that is, the excess of our model dr represents net capital inflow, that is, the excess of the supply of money from domestic sources. In order for increase in the supply of money to be matched by an increase in the stock of reserves, the supply of money must match the excess of the increase in money demand.

Rewrite this equation as

\[ dr = dpc + \frac{dpc}{m} + \frac{dmr}{m} + \frac{dmr}{m} \]

By changes in demand. A monetarist would find it more instructive to state that changes in supply must be matched by changes in demand. This equation simply states that changes in supply must be matched by changes in demand.

\[ dr + dr^e - \frac{dmr}{m} + \frac{dmr}{m} = 0 \]

Where increases in $M$ represent shifts in the ratios of U.S. wealth holders toward money and away from other assets. If the U.S. money market is to return to equilibrium after a change in some of its parameters, the changes in its parameters must be matched.

\[ M = \Psi + S + \Psi + \Psi \]

- 124 -
The monetary approach [Johnson (1962)] is usually presented in

\[ T \]

and its use in describing what we believe to be the essence of

\[ T \]

and de're jointly determined and their values depend upon the type

assumption dr and de can no longer be taken as exogenous. dr, de,

However, as we have seen once we abandon the small country

account for a small country.

central bank and we have a complete theory of the portfolio capital

changes are equal to the negative of open market purchases by the

the demand for money so that dp is equal to zero. In this case reserve

addition, we assume, as monetarists often do, that there are no shifts in

us assume for simplicity that they are both equal to zero. Suppose in

under consideration is small, dr and de are given exogenously. Let

bank, and dp depends upon wealth holders' preferences. Now if the country

decrements. dp is a policy variable under the control of the central

of reserve changes the monetarists must explain how dr and de are

of payments, or more accurately, in the context of our model, a theory

of payments. Like the official settlements concept of the

monetary models, the time rate of change of the stock of reserves

real income as well as upon interest rates. In these more complete

performed. The demand for real balances is assumed to depend on

response to time, then various other algebraic manipulations are

equilibrium in the market for real balances is different from with

equilibrium relationships between these growth rates of the variables considered. To obtain the

terms of the growth rates of the variables considered, as usually presented in

The monetary approach [Johnson (1962)] is usually presented in

\[ T \]
Fully specified model of the type we have investigated in this paper.

the equation of equilibrium changes for the money market to a more
for a large country it seems to us that it is necessary to look beyond
determinants of reserve changes due to net flows of financial capital
response of the central banks. When accepting to analyze the
of disturbance or policy action undertaken and upon the policy
whatever values are appropriate for the problem under consideration. If it is assumed that the $H_i$'s are held constant at

can be analyzed by setting the $H_i$'s appropriately. Each to zero and then letting a decrease. Other preference shifts
setting $H_i$ equal to one if equal to minus one, and all other $H_i$'s
U.K. securities and assets, U.S. securities can be represented by
example, a shift in the preferences of U.S. citizens in favor of
values appropriate to the problem under consideration so that, for
functions with respect to their third arguments. The $H_i$'s are given
where $p_2$, $f_3$, etc. are the partial derivatives of the asset demand

\[
\begin{align*}
(47) \quad \frac{\partial p_2}{\partial x_3} & = 0, i = 1,2 \\
(48) \quad \varepsilon_{i,j} = \varepsilon = \varepsilon_{j} = \varepsilon_{j} = \varepsilon_{j} \\
(49) \quad \varepsilon_{j} = \varepsilon_{j} = \varepsilon_{j} = \varepsilon_{j}
\end{align*}
\]

subject to the following restrictions:
The $H_i$'s are shift parameters which cause changes in asset demands

\[
\begin{align*}
(44) \quad 0 & = \left\{ \sum_{j} \beta_j + \sum_{j} S_j + \sum_{j} (\beta_j \cdot \sigma_j) \cdot \rho_{j} + \sum_{j} \gamma_{j} \cdot \mu_{j} \right\} - \Delta (\varepsilon_{i}^{2} \varepsilon_{1} \varepsilon_{2} \varepsilon_{3} \varepsilon_{4} \varepsilon_{5} \varepsilon_{6} \varepsilon_{7} \varepsilon_{8}) \\
(45) \quad 0 & = (S + \beta_{j} \cdot \rho_{j}) - \Delta (\varepsilon_{i}^{2} \varepsilon_{1} \varepsilon_{2} \varepsilon_{3} \varepsilon_{4} \varepsilon_{5} \varepsilon_{6} \varepsilon_{7} \varepsilon_{8}) \\
(42) \quad 0 & = (\beta_{j} \cdot \rho_{j} - \Delta (\varepsilon_{i}^{2} \varepsilon_{1} \varepsilon_{2} \varepsilon_{3} \varepsilon_{4} \varepsilon_{5} \varepsilon_{6} \varepsilon_{7} \varepsilon_{8})) \\
(41) \quad 0 & = (\beta_{j} \cdot \rho_{j} - \Delta (\varepsilon_{i}^{2} \varepsilon_{1} \varepsilon_{2} \varepsilon_{3} \varepsilon_{4} \varepsilon_{5} \varepsilon_{6} \varepsilon_{7} \varepsilon_{8}))
\end{align*}
\]

county can be written as follows:

In this essay where there is no commercial banking system in either
the equilibrium conditions for the four markets studied

I. The Comparative Statics Model

Appendix
It should also be observed that in the same equilibrium position, \( q \) represents holdings of U.K. securities by U.K. citizens and \( p^{(4)} \) represents the holdings of U.K. securities by U.S. citizens.

\[
B_{(q)} = p_{(q)} + \Pi^{(q)} - I^{(q)}
\]

That when \( q \) changes, \( M \) and \( W \) change so, for example,

\[
0 = b^{(x)} - b^{(x)} + N^{(x)} + M^{(x)} + W^{(x)} + P^{(x)} - P^{(x)}
\]

where \( x \) is any element of the vector \( x \). It is important to note that the equilibrium conditions are independent, so we have,

\[
N^{(x)} = c^{(x)} + p^{(x)} + m^{(x)} + a^{(x)}
\]

where \( x \) is defined as follows:

\[
0 = (S^{(x)} - F^{(x)})
\]

\[
0 = (S^{(x)} - F^{(x)})
\]

\[
0 = \frac{N^{(x)}}{P^{(x)}}
\]

\[
0 = \frac{M^{(x)}}{P^{(x)}}
\]

\[
0 = \frac{W^{(x)}}{P^{(x)}}
\]

System in the following form, and that \( M \) and \( W \) are fixed unless \( q \) changes, we can rewrite the
where the relationship among $d_0$, $d$, and $d^*$ is given by

\[(A19)\]
\[ds = \frac{-\bar{r}_d d^*}{\bar{r}_d - \bar{r}_d d^*}\]

\[(A18)\]
\[ds = \bar{r}_d d^*\]

Reserve assets in the relevant country due to a change in $d^*$, opposite in sign to changes in the home currency value of outside central bank balance sheet, are restricted to be equal in size but sterilization activities, changes in $s$ and $\bar{s}$, the balancing items on the sterilization activities, we call $\lambda$ and $\gamma$, the coefficients of U.K. money stock, and $\Delta_C$, represents open purchases unrelated to UKCB in order to sterilize the impact of reserve outflows on the U.S. money stock while $\Delta_C$, represents open market purchases unrelated to sterilization activities. Similarly, $\gamma$, represents the open market purchases by the U.S. money stock while $\gamma$, represents the open market sales undertaken by the USD in order to sterilize the impact of reserve outflows on $\bar{r}_d$, where $0 < \lambda \neq 1$, represents the open market purchases undertaken

\[(A17)\]
\[\Delta_C^* = \bar{r}_d + \Delta C^*\]

\[(A16)\]
\[\Delta C^* = \gamma \lambda \Delta C^*\]

are defined as follows:

when obtaining the total differentials, The changes in $\beta$ and $\beta'$, (A11), we make use of two definitions and impose two restrictions of equation (A8) through the model we find the local differentials of equation properties

In order to analyze the comparative statics properties

\[(A15)\]
\[B^* = \beta^* \Delta C^* + \beta^*_1 \Delta C^*_1\]

depends upon the values of the relevant coefficients, so that, for example, the effect of a change in $a$ on the excess demand for a given asset
In Chapter III plus some additional ones, non-zero be, and for changes in $P$, we could derive all the results seen there on page 1 of Appendix. It was allowed for a demand function with respect to $Q_x$ and the $h_{ij}$'s which appear in the partial derivatives of the excess variales as exogenous and by choosing appropriate values for $\lambda$. Variables to regard as endogenous and treating the remaining text can be derived by selecting the appropriate set of three chapters II and IV plus some additional ones not discussed in the text.

In seven unknowns, all of the comparative statics results in four equations yield a system of three independent equations. (All) in matrix form as shown in Table I, this is a system of four independent equations in seven unknowns. Given the definitions and restrictions of the last paragraph we can write the total differentials of (48) through

\[
\text{(A20)}
\]

\[
\frac{\partial}{\partial t} \frac{\partial}{\partial s} \frac{\partial}{\partial P} = \frac{\partial}{\partial s}
\]

- 140 -
\[
\begin{bmatrix}
p_a \\
p_\mu \\
p_\nu \\
p_{\rho} \\
p_{\kappa} \\
p_{\tau}
\end{bmatrix}
\begin{bmatrix}
\rho_N \\
\mu_N \\
\nu_N \\
\rho_\mu \\
\nu_\mu \\
\nu_\nu \\
\rho_\nu \\
\nu_\nu \\
\rho_\kappa \\
\nu_\kappa \\
\rho_\tau \\
\nu_\tau
\end{bmatrix}
\begin{bmatrix}
0 \\
0 \\
1 \\
0 \\
0 \\
0 \\
0 \\
0 \\
1 \\
1 \\
-1 \\
-1
\end{bmatrix}
= 
\begin{bmatrix}
1 \\
1 \\
1 \\
1 \\
1 \\
1 \\
1 \\
1 \\
1 \\
1 \\
1 \\
1
\end{bmatrix}
\]

Table I
Following system:

\[ \text{and taking } \delta t, \text{ \& } dK \text{ as the endogenous variables leads to the} \]

\[ \text{dropping the fourth equation from the system shown in Table I} \]

\[ \text{what the initial disturbance.} \]

\[ \text{holdings are required for the restoration of equilibrium no matter} \]

\[ \text{the sense that smaller absolute changes in international reserve} \]

\[ \text{adjustment increases the efficiency of the adjustment mechanism in} \]

\[ \text{money adjustment without increasing reliance on pure security} \]

\[ \text{a change in sterilization behavior which increases reliance on pure} \]

\[ \text{the sterilization behavior of the two central banks and show that} \]

\[ \text{adjustment and what we call pure security adjustment in terms of} \]

\[ \text{any initial disturbance. We then define what we call pure money} \]

\[ \text{must occur when wealth holders adjust their portfolios following} \]

\[ \text{absolute size of the change in international reserve holdings which} \]

\[ \text{are sterilized by either of the two central banks, the larger the} \]

\[ \text{in the money supply due to changes in international reserves which} \]

\[ \text{this section we demonstrate that the larger the proportion of changes} \]

\[ \text{international reserves except in some extreme limiting cases,} \]

\[ \text{all or part of the money supply changes associated with changes in} \]

\[ \text{portfolio equilibrium whether or not central banks act to sterilize} \]

\[ \text{successfully adjust their portfolios following a disturbance to} \]

\[ \text{in the text we argue that in our model wealth holders can} \]

\[ \text{in International Reserve Holdings Required for Adjustment.} \]

\[ \text{II. The Effect of Central Bank Sterilization Behavior on the Changes} \]

- 142 -
is less negatively sloped than the NN schedule implies \( \forall M \neq 0 \).

For \( \exists p, \exists M, \exists \Phi \) and \( \forall M \). Our assumption that the NN schedule

Our assumption of cross substitutability implies the signs shown above

\[
\begin{align*}
(4.29) & \quad 0 < \frac{1}{1} N^M - \frac{1}{1} N^P = NA \\
(4.28) & \quad 0 > \frac{1}{1} N^P - \frac{1}{1} N^D = NA \\
(4.27) & \quad 0 > \frac{1}{1} N^P - \frac{1}{1} N^P = NA \\
(4.26) & \quad 0 < \frac{1}{1} N^P - \frac{1}{1} N^P = NA \\
(4.25) & \quad 0 < \frac{1}{1} P^P - \frac{1}{1} P^P = NA \\
\end{align*}
\]

Now define:

\[
(4.24) \quad \gamma r p_{1} - p_{2} \gamma m_{1} - p_{2} m_{1} + \gamma p_{1} + \gamma p_{2}
\]

\[
\text{det } C = (1 - \gamma)(1 - \gamma) + \gamma (1 - \gamma) (1 - \gamma) = 0
\]

Then we have,

Let \( c \) be the matrix of the coefficients of \( dt \), and \( dh \).

\[
(4.23) \quad [ a b c d e f g h i j k l m n o p q r s t u v w x y z ] = \gamma
\]

\[
\text{of which are the elements of } \gamma
\]

\[
\text{for example, the derivatives of } p, m
\]

\[
\text{and } \gamma \text{ with respect to the variables the differentials}
\]

\[
\text{are the vectors of the } \gamma
\]

\[
\text{of the variables.}
\]

\[
(4.22) \quad \hat{\gamma} = \gamma
\]

\[
\text{is a } 4 \times 1 \text{ column vector and } \hat{\gamma} \text{ is given by}
\]

\[
\begin{bmatrix}
\hat{\gamma}_p \\
\hat{\gamma}_m \\
\hat{\gamma}_d \\
\hat{\gamma}_b
\end{bmatrix}
= \begin{bmatrix}
\gamma \\
1 \\
1 \\
1 \\
\end{bmatrix}
\begin{bmatrix}
\hat{\gamma}_p \\
\hat{\gamma}_m \\
\hat{\gamma}_d \\
\hat{\gamma}_b
\end{bmatrix}
\]

\[
\begin{bmatrix}
\hat{\gamma}_p \\
\hat{\gamma}_m \\
\hat{\gamma}_d \\
\hat{\gamma}_b
\end{bmatrix} = \begin{bmatrix}
\gamma \\
1 \\
1 \\
1 \\
\end{bmatrix}
\]

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\[ \text{This identity can be established by using (A13).} \]

Changes due to changes in international reserves which are sterilized
Thus we have proved that the larger the proportion of money supply
that raising either \( \lambda \) or \( \gamma \) makes \( \text{det} \) a smaller negative number.
Determine that \( \lambda \) does not depend upon \( \gamma \). We know from (A32)
Inspecting all the terms that are involved in calculating \( \text{det} \) we can

where \( D \) is a scalar which can be either positive or negative. By
\[
\text{det} (\text{det} (D - 1)) = D \prod (A33)
\]

\[ \text{Solving for } \text{det} \text{ we find,} \]

\[ \text{so } \text{det} \text{ is always negative for } 0 < \gamma, \lambda > 1 \]

(A34)

and we can establish that,
\[ \text{det} \]

(A33)

We can establish that \( \text{det} \) is negative for all \( 0 < \gamma, \lambda < 1 \),

(A32)

we can also write,
\[ \text{det} \]

(A31)

It is helpful to note that since,
\[ \text{det} \]

(A30)

Given these definitions we can rewrite \( \text{det} \) as,

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\[
E = \left[ \left( \frac{\delta P}{\gamma P} \right) \gamma P + \left( \frac{\delta P}{\gamma P} \right) \gamma P \right] - (\gamma - 1) \left( \frac{\delta P}{\gamma P} \right) \gamma P
\]

This interpretation of \( E \) is easier to explain if we rewrite it as:

\[
E = \left( \frac{\delta P}{\gamma P} \right) \gamma P + \left( \frac{\delta P}{\gamma P} \right) \gamma P - (\gamma - 1) \left( \frac{\delta P}{\gamma P} \right) \gamma P
\]

In this form, \( E \) can be viewed as the net excess demand for money, adjusted to clear both security markets and balance the disturbance \( \delta P \).

The economies behind this result can be more easily understood if we multiply and divide (A.3.4) by \( \gamma P \) to obtain:

\[
\frac{\delta R}{\gamma P} = E - \frac{\delta P}{\gamma P}
\]

International reserves required for adjustment by either central bank is larger than the absolute change in holdings of

\[
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\]
We can see from (A4.1) that an increase in \( \lambda \) lowers the amount by which a rise in \( R \) directly reduces the excess demand for money. The same increase in \( \lambda \) also raises (lowers) the amount by which a rise in \( R \) indirectly reduces (increases) the excess demand for money. From (A4.2) we know that the reduction in the direct effect (offsetting) indirect effect. An increase in \( \lambda \) lowers (raises) the amount by which a rise in \( R \) indirectly reduces (increases) the excess demand for money.

It is instructive to investigate how central bank sterilization behavior affects the channels through which the portfolio adjustment following an initial disturbance proceeds. Of course, changes in both interest rates are usually necessary for adjustment, but here we focus attention on the required changes in money supplies and supplies of securities in the hands of the public. From the two central bank balance sheets we have,

\[
\text{Here we view } dB^C \text{ and } dC^C \text{ as initial disturbances so that while these variables affect the total changes in money supplies and supplies of securities in the hands of the public, equilibrium they do not affect the changes in these supplies during the adjustment process following an initial disturbance.}
\]
short money since the amount by which a given increase in \( R \) lowers the excess demand for money since \( R \) is always negative.

We also know that an increase in either \( X \) or \( Y \) lowers an increase in \( R \) is always a reduction in the excess demand for money. We know that the net impact of the direct and indirect effects of decreases in either \( R \) or \( Y \) partially offset the direct effect.

Of course, increases in either \( R \) or \( Y \) reinforce the direct effect. General case, the interest rates may both move in either direction.

That a rise in \( R \) leads to a fall in \( X \) and a rise in \( R \), in the limit if \( X \) is equal to \( X \), one assumption of excess substitutes implies \( X \) is positive.) Then a rise in \( R \) leads to a rise (fall). In the same case, if \( X \) is zero and \( X \) is positive (\( X \) is zero and \( X \) is positive), then \( X \) or \( X \) is the dominant.

It is helpful to consider some interest rates up, but the decrease in supply of U.K. securities increases in the supply of U.S. securities tends to drive both supply of U.K. securities available for the public to hold. The increase in the supply of U.S. securities and a reduction in the sterilization operations following an increase in \( R \) lead to an increase in security supplies which result from sterilization operations in the two countries following an increase in \( R \). Required to sterilize are the two securities markets given the
In the currency of their respective countries...
we call mixed money-security adjustment, the proportion of the total adjustment, or
accomplished by pure money adjustment, an adjustment by decreases (increases) in the world supply of bonds, a process which
and part is pure security adjustment, but a part of the adjustment is
difficult. In this case part of the adjustment is pure money adjustment,
The case in which 0 < \( \gamma \) \( \neq \) 1 but \( \gamma \) is a little more
on pure money adjustment implies equal decreases in \( \gamma \) and \( \lambda \).
In reserve holdings are required for adjustment since greater reliance
in reserve mechanisms in the sense that smaller changes
so far the greater the reliance on pure money adjustment the more
recommitted, we can conclude that in the cases we have considered
securities remain constant but some part of both supplies is
adjustment remains constant but some part of both supplies is
(1-\( \gamma \)) \( \lambda \) = (1-\( \lambda \)) \( \gamma \), the world money supply and the world supply of
adjustment, or |accomplished by pure money adjustment is given by
adjustment and pure security adjustment, the proportion of the total
adjustment is accomplished through a combination of pure money
adjustment. If 0 < \( \gamma \) \( \neq \) 1 and \( \gamma = \lambda \) then we say that
change in money supplies, part of the fixed world supply of securities
accomplished completely through pure money adjustment with no
change in their money supplies (\( \gamma = 1 \)), adjustment is
money supply is recommitted, when both central banks sterilize all
in the supply of either type of security, part of the fixed world
accomplished completely through pure money adjustment with no change
determine whether adjustment is more or less efficient.

must know the values of the parameters in (c) 1 before we can
more (less) efficient, but if they move in opposite directions, we
in the present case if both \( x \) and \( y \) fall (rise), adjustment is
has improved.

is its utility function before we can determine whether or not it ac-
consumes more of some goods and fewer of others, we must know
of all goods, he is unambiguously better (worse) off, but if he
consumes a new consumption bundle. If he consumes more (fewer)
determining whether or not a consumer is better off when we observe
the problem encountered here is analogous to the problem of
opposite directions in (c) 1 in (4.3).

when an increase in reliance on pure money adjustment is
and \( y \), does not increase.

reliance on pure security adjustment implies that the smaller of
requires a decrease in the larger of \( x \) and \( y \), while no increase in
efficient, since an increase in the reliance on pure money adjustment
security adjustment then the adjustment mechanism is made more
adjustment is increased with no increase in the reliance on pure

we can now state the general conclusion that if reliance on pure money-

adjusted money-security adjustment is \( \{ x, y \} \) the proportion of adjustment accomplished

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III. Some Implications of the Application of Stability Analysis.

In this section we investigate the implications of applying stability analysis of the conventional kind to the important variant of our model in which $r$, $r'$, and $R$ are the endogenous variables. We have two major points to make. First, we show that the restrictions on the slopes of the BB, FF, MM, and NN schedules employed in the text are consistent with stability under a plausible set of assumptions about how the endogenous variables change in response to disequilibria. Second, we show that certain restrictions must be placed upon the relative speeds of adjustment in the different markets if stability is to be guaranteed under our assumptions and suggest why these restrictions are required.

Let us assume that the way in which the endogenous variables change in response to disequilibria can be described by the following set of equations:

\[
\frac{\dot{r}}{r} = -\alpha_1 \frac{B(x)}{B-C}, \alpha_1 > 0, \tag{A47}
\]

\[
\frac{\dot{r}'}{r'} = \alpha_2 \frac{F(x)}{\pi(F-Pc')}, \alpha_2 > 0, \tag{A48}
\]

\[
\frac{\dot{R}}{R} = \alpha_3 \frac{M(x_1, \sigma, S)}{Bc + cR + S}, \alpha_3 > 0. \tag{A49}
\]

$r$ rises in response to excess supply of U.S. securities; $r'$ rises in response to excess supply of U.K. securities; $R$ rises in response
\[
\begin{align*}
\gamma &= 0, \quad \phi = 0, \\
\rho &= 0, \\
\beta &= 0, \\
\alpha &= 0.
\end{align*}
\]

We can rewrite (416) and (417) as

\[
\bar{\rho} = 0, \quad \bar{\alpha} = 0.
\]

Note that \(\bar{\rho} = 0\), \(\bar{\beta} = 0\).

By using (450) instead of (449), we can restate the similarities and minor differences in results implicitly.

Both money markets are restricted to restrict ourselves to reporting in constant utility where what would happen to \(R\) when there is excess demand in any areas in other familiar models is ill-defined. More specifically, it would take us too far afield to try to specify more demand in both money markets. A similar potential inconsistency (449) and (450) can be inconsistent since for some \(X\) there is excess.

\[
\begin{align*}
- \frac{\phi}{\alpha} &= \frac{m - \alpha}{\beta + (\gamma - \rho) - \alpha}, \\
- \frac{\phi}{\alpha} &= \frac{m - \alpha}{\beta + (\gamma - \rho) - \alpha}.
\end{align*}
\]

To excess demand or money in the U.K. so that, it would be just as plausible to assume that it falls in response to excess variables from \(0, \alpha, \rho\).

Table II, \(d_1, d_2\), and \(d_3\) represent deviations of the definitions and restrictions of part I of the appendix are displayed.

The system about the equilibrium values \((0, \alpha, \rho)\) using the system by investigating the behavior of the associated linear system we can study the local stability properties of our dynamic and \(d_3\) are dimensionsless.

As a percent of supply in that market, under this assumption of the excess supply or demand in the market to which it responds in each endogenous variable as a percent of its level is proportional to excess demand for money in the U.K. so that, it would be just as plausible to assume that it falls in response.
\[
\begin{bmatrix}
\overline{\chi}_p & \overline{\chi}_w & \chi_g \\
\overline{\chi}_p & \overline{\chi}_d & \chi_g \\
\overline{\chi}_p & \overline{\chi}_d & \chi_g \\
\end{bmatrix}
+ \begin{bmatrix}
\chi_p \\
\chi_p \\
\chi_p \\
\end{bmatrix}
+ \begin{bmatrix}
(\chi-1) & 1 & \chi_w \\
\chi & 1 & \chi_d \\
\chi & 1 & \chi_d \\
\end{bmatrix}
\begin{bmatrix}
\chi_g \\
0 \\
0 \\
\end{bmatrix}
= \begin{bmatrix}
\chi_r \\
\chi_r \\
\chi_r \\
\end{bmatrix}
\]

Table II
\text{See, for example, Samuelson} (1963), \text{pp. 429-439.}\)

\[
d_a = a - u, \quad d_m = m - u, \quad d_f = f - \mu, \quad d_c = c - \mu
\]

That is, \(d_{bc} = \frac{g_{bc}}{1}\)

\[
(323) \quad 0 = 3 + a \varepsilon + 2 \varepsilon^2 + \varepsilon_1^2 + \varepsilon_2
\]

which can be written in the form,

\[
(324) \quad 0 = \begin{vmatrix}
\gamma & 1 & \varepsilon \\
1 & \gamma & 1 \\
\varepsilon & 1 & \gamma
\end{vmatrix}
\]

is given by

The characteristic polynomial of the system of Table II

The stability analysis proceeds according to the usual procedure.

\[
0 < \frac{g_0}{\gamma} + \frac{g_0 \gamma}{r} + \frac{g_0 \gamma^2}{r^2} = \varepsilon_0
\]

\[
0 < \frac{g_1 \gamma}{r} = \varepsilon_1
\]

\[
0 < \frac{g_2 \gamma^2}{r^2} = \varepsilon_2
\]

\[
\varepsilon_1, \varepsilon_2, \text{ and } \varepsilon_3 \text{ are given by.}
\]

\[
\bar{P}_1, \bar{P}_2, \text{ and } \bar{P}_3 \text{ are defined as in Part II of the Appendix.}
\]

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and $(A_{50})$ is linearized.

coefficients of the system made up of $(A_{47})$, $(A_{48})$, and det $K$ is the determinant of the matrix $K$, the matrix of the

\[ \det BN = 
\begin{bmatrix}
0 & 0 \\
0 & 0 \\
\end{bmatrix}
\]

meaning here and,

where those symbols defined in Part II of the Appendix have the same

\[ \text{det } K = BN_{1,1} + BN_{1,2} + BN_{2,1} + BN_{2,2} \]

\[ a_1 A_{456} = p_1 g_1^2 g_4 \]

\[ a_2 A_{457} = p_1 g_1^2 g_4 + p_1 g_1^2 g_4 (\gamma - 1) \]

\[ a_2 A_{458} = p_1 g_1^2 g_4 + p_1 g_1^2 g_4 (\gamma - 1) x \]

If we had used $(A_{50})$ instead of $(A_{49})$, we would have,

the system which describes the responses of the endogenous variables

If our comparative statics results are to be meaningful,

\[ \text{det } C = \]

\[ [BN_{1,1} + BN_{1,2} + BN_{2,1} + BN_{2,2}] \cdot \]

\[ a_1 A_{459} = \]

\[ a_2 A_{460} = \]

\[ a_2 A_{461} = \]

where,$$
\[ \alpha_{NN} \] is defined as in Part II of the Appendix.

Assumptions and restrictions.

At least one of page 155 is always positive under these same conditions.

\[ \gamma > 0 \]

\[ \gamma > 0 \]

Consider cases in which \( \gamma \), \( \gamma' \) are also positive.

\[ \gamma > 0 \]

As we shall see in Part IV of the Appendix it is also useful to consider the case where \( \gamma = 0 \) for example, Samuelson, op. cit.

\[ \gamma \]

Thus, if the system of Table II is to be stable, then \( \alpha_{NN} \) and \( \alpha_{NN} \) are positive. This follows from our analysis of the central bank's behavior by the two central banks, the conclusions above must hold for all \( \alpha_{NN} \) \( \alpha_{NN} \) \( \alpha_{NN} \) \( \alpha_{NN} \) and \( \alpha_{NN} \) just stated, \( \alpha_{NN} \) is always positive.

From our analysis of the central bank's behavior by the two central banks, the conclusions above must hold for all \( \alpha_{NN} \).

Given our assumptions about interest rates

To assure that the system is stable for all plausible sterilization

\[ \frac{\Delta^2 - \Delta + 3}{\Delta^2 + \Delta + 3} < 0. \]

\[ \frac{\Delta^2 + \Delta + 3}{\Delta^2 - \Delta + 3} < 0. \]

\[ \frac{\Delta^2 - \Delta + 3}{\Delta^2 + \Delta + 3} < 0. \]

Conditions for the stability of the system of Table II are given by

\[ \Delta^2 - \Delta + 3 < 0 \]

To ensure supplies and demands must be stable, necessary and sufficient
It is not true that $a_1 < 0$, $a_2 > 0$, and $a_3 < 0$ imply $a_4$. Let $\delta = \frac{\delta}{\delta}, g \geq 2$.

Since $\delta = \frac{\delta}{\delta}, g \geq 2$,

Furthermore we have that

$\delta = \frac{\delta}{\delta}, g \geq 2$.

The same conditions are necessary and sufficient to ensure that $a_j > 0$ for all $j$, if and only if $\delta > 0$.

Therefore $a_j > 0$.

are allowed to take on all values between zero and one. To see this, from (A5.5) we can see that $a_j$ need not be positive for all values of $a_1, a_2, a_3, a_4, a_5, a_6$. From (A5.6) we can see that $a_j$ need not be positive for all values of $a_1, a_2, a_3, a_4, a_5, a_6$. But to note that (A6.1), (A6.2), and (A6.3) taken together imply $a_j > 0$, it is necessary to ensure that $a_j$ is positive for all $j$. We must place restrictions on the coefficients. The easiest way to see this is if $a_1 > 0$, $a_2 > 0$, $a_3 > 0$, $a_4 > 0$, $a_5 > 0$, $a_6 > 0$, $a_7 > 0$. However, so far it has not been necessary to consider the relative magnitudes of the adjustment coefficients of $a_1, a_2, a_3, a_4, a_5, a_6, a_7$. However, in the text.

FP and of the MA and MN curves must be as we have described them be stable for all $j$, if the relative slopes of the BB and
(4e3) \[ g_2 = 0 \]

(4e4) \[ g_1 = 0 \]

(4e2) \[ \alpha_1 g_1 + C_1 > 0 \]

where

(4e1) \[ 0 \leq \frac{g_2}{g_1} \leq 1 \]

Now when \( g_1 = 0 \), \( \gamma = \frac{1}{\gamma_1} \), \( \gamma \) is positive for \( \gamma = \frac{1}{\gamma_1} \).

If \( \gamma = \gamma_1 \), then \( \gamma \) is positive for \( \gamma = \frac{1}{\gamma_1} \).

In this footnote we sketch the derivation of a sufficient condition for the system to be unstable. Suppose that the parameters \( g_1 \) and \( g_2 \) are positive for all \( \gamma \), \( \gamma \leq 0 \), \( \gamma \leq \gamma_1 \). The exact conditions on \( g_1 \), \( g_2 \), and \( \gamma \) which insure that \( g_1 \) and \( g_2 \) approach one. It is clear that for values of \( \gamma \) near enough to zero and values of \( \gamma \) near enough to one, \( g_1 \) and \( g_2 \) approach zero, and let

(4a1) \[ \left\{ \begin{array}{l} g_1^2 \frac{\gamma}{g_1} + \left[ g_2 (\gamma_1 - 1) \right] + \frac{g_1^2}{g_2} \frac{\gamma}{g_1} = \frac{g_1^2}{g_2} \\ g_2 \end{array} \right\} \]

Suppose that Figure 23 represents the system. The exact conditions on \( g_1 \), \( g_2 \), and \( \gamma \) which must be insured are described less formally. But the destabilizing processes the affect which must be insured are not very instructive.
A sufficient condition for $A_{12} - A_2^2 > 0$ to be positive for all $x_1, x_2, y_1, y_2$ is that $A_{12} > A_2^2$. A similar line of argument can be used to sketch a derivatives of $I_1$ at a point $I_2$ where $A_{12} > A_2^2$.

Relevant results so far: $A_{12} > A_2^2$ for $x_1 > x_2$ (and $A_{12} < A_2^2$ for $x_1 < x_2$), and $A_{12} > A_2^2$ if $x_1 > x_2$.

Given all the other parameters, we can solve for the positive value of $I_1$ at $I_2$. The diagram illustrates the regions where $I_1 > I_2$ and $I_1 < I_2$.

Figure 23 (Continued from previous page)
the configuration of the BB, FF, MM, and NN schedules after an
initial disturbance. Let us assume that the equilibrium point before
the shock was at \( a_0 \) and that \( \lambda = \lambda^*_1 = 1 \) so that the new equilibrium
point is at \( a_1 \). Horizontal arrows pointing left or right represent
the pressure on \( r \) in each of the four regions marked off by the
BB and FF schedules. Vertical arrows pointing up and down represent
the pressure on \( r \) in each of the four regions. At \( a_0 \), for example
there is an excess supply of U.S. securities and an excess demand for
U.S. securities, so there is upward pressure on \( r \) and downward pressure
on \( r \). Diagonal arrows pointing southeast and northwest represent
the effects of sterilization operations on the BB and FF schedules.

For all interest rate pairs above (below) the MM schedule there is an
excess supply of demand for U.S. money, and the U.S. loses (accumu-
lates) reserves. These losses (accumulations) lead to a decrease
in the supply of U.S. securities and an increase (decrease)
in the supply of U.S. securities due to sterilization operations of the
two central banks. At \( a_0 \), for example, there is an excess supply of
U.S. money, and the sterilization of U.S. reserve losses implies that
BB and FF move to the southeast. As long as the prevailing interest
rate remains in the shaded region above MM and FF, \( r \) rises. If
we replace \( \lambda^*_2 \) by \( \lambda^*_2 \), BB and FF move northwest if the
prevailing interest rate pair lies above NN and southeast if the
prevailing interest rate pair lies below NN.
We have seen above that for \( x = \sqrt{2} \) and a value of

\[ \gamma \]

and the U.S. accumulates reserves without limit.

The shaded region below PM, BB, and PP. In this case if it fails, it rises.

In the prevailing interest rate part becoming "trapped" in the

used to suggest how a value of \( \sqrt{2} \) which is "too small" can result

This same line of argument with minor modifications can be

in the prevailing interest rate part, and the system is unstable.

Region above PM and PP expands rapidly enough so that it always con-

BB and PP. If \( \sqrt{2} \) is "too small" I relative to Q and \( \gamma \) the shaded

excess supply of money accentuates the southeasterward movement of

decreases in R due to U.S. citizens attempts to get rid of their

U.K. securities accentuate the southeasterward movement of BB and PP.

But increases in R, while tending to equilibrate the market for

U.S. securities and retard the southeasterward movement of BB and

central banks. Increases in R tend to equilibrate the market for

size of U.S. reserve losses and sterilization operations by the two

citizens to their excess supply of money, \( Q \), which determines the

\( \sqrt{2} \) to excess supply for U.K. securities, \( Q \), and the response of U.S.

demand for U.S. securities, \( Q \), is small relative to the response of
can conclude that the prevailing interest rate part will remain in

continue without limit. Without accumulating to be precisely we
case the characteristic equation of the system must have one positive
root or a pair of complex roots with a positive real part, and the
system is unstable. In terms of Figure 23 the prevailing interest
rate pair eventually becomes "trapped" in one of the two shaded
regions. When \(0 \leq \lambda, \lambda' < 1\), similar destabilizing forces are at
work. The discussion above could be modified to take account of
this more complicated case. As above, the size of \(\alpha_1\) relative to
the size of \(\alpha_2\) and \(\alpha_3\) would be important in determining whether or
not instability could arise.

However, this essay is concerned with the comparative
statics properties of the model. Since comparative statics analysis
is only meaningful when the system attains a new equilibrium after
an initial disturbance, we assume that \(\alpha_1\) is "large enough" relative
to \(\alpha_2\) and \(\alpha_3\) to assure that the system is stable for \(0 \leq \lambda, \lambda' < 1\).

IV. The Comparative Statics Model With Fractional Reserve Commercial
Banking

The purpose of this part of the Appendix is to show that,
under certain assumptions, conclusions based on the model of Part I
of the Appendix, when properly interpreted, are identical to
conclusions based on a model which takes explicit account of
fractional reserve commercial banking. The equilibrium conditions

1/ See footnote 1 on page 158 for a condition sufficient to
ensure stability.
Although $X$ is defined as above, we repeat the definition here for

\[ a(x) = \frac{(S + b)^{\alpha}}{1 - \rho} + \frac{(\tau - \rho)}{1 - \rho} + \frac{1}{1 - \rho} \]\n
as follows. Banking is explicitly introduced in both countries can be written

For the four markets studied in this essay when fractional reserve

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the coefficients of sterilization for high powered money.

market purchases unrelated to sterilization activities. \( \gamma \) and \( \chi \) are
of reserve flows on the U.K. money stock, and \( DPC \) represents open
market purchases undertaken by the UKCB to sterilize the impact
of sterilization activities. Similarly, \( \chi' \) where \( 0 \leq \chi' < 1 \), represents
powered money while \( DPC' \) represents open market purchases unrelated to
the USCB to sterilize the impact of reserve inflows on U.S. high

\[
\begin{align*}
\Delta P & = \gamma' \Delta R + DPC' \\
\Delta P' & = \chi' \Delta R' + DPC'
\end{align*}
\]

The changes in \( P \) and \( P' \) are defined as follows:

\[
\text{(4.74)} \]  

making use of two definitions and imposing two restrictions.

We now obtain the local differentials of \( \text{(4.71)} \) through

relevant H integration.

on the excess demand for a given asset depends upon the value of the
where \( P_a \) and \( P_b \) are defined as above. The effect of a change in a

\[
\begin{align*}
\Delta P_a & = - \frac{1}{q} \frac{\partial q}{\partial P_a} \\
\Delta P_b & = \frac{1}{q}
\end{align*}
\]

Appendix M and \( \Delta P \) change when \( \Delta P \) change so, for example,
where \( x_i \) is any element of the vector \( \vec{x} \). As in part I of the

\[
\begin{align*}
\Delta x_i & = \frac{x_i}{\sqrt{\Delta x^T \Delta x}} \\
0 & \equiv \sqrt{\Delta x^T \Delta x}
\end{align*}
\]

market equilibrium conditions are independent, so we have,

as we have argued on page 82 of the text only three of the four

\[
\begin{align*}
\vec{x} & \equiv (R', P', D', P'_C) \\
& (a)
\end{align*}
\]

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available to the public falls by \((I - \gamma) \left( \frac{\partial}{\partial \Gamma} \right) \), because the stock of part of the effect of \( \theta \) on high-powered money. The supply of securities of open market sales by the USCB undertaken in order to sterilize supply of securities available to the public rises by \( \theta \) because of the increase in international reserves held by the USCB. The of U.S. securities available for the public to hold as a proportion of U.S. securities available to the supply

The term \( \left[ I - \gamma \right] \left( \frac{\partial}{\partial \Gamma} \right) \) represents the change in the supply

\[ \text{from part I with respect to the same variables.} \]

\( r \), \( r \), \( m \), and \( a \) are equal to the partial derivatives of \( b \), \( \beta \), and \( \beta \) with respect to the parameters as differentials. Another way of saying the same thing is that the partial derivatives are equal to the Jacobian matrix and the two are equal in the identical to the system of Table I except for the third column of the system of Table III. The system of Table III is shown in matrix form in Table III. The system of Table III is

8Graph we can write the local differentials of \( \frac{\partial}{\partial \Gamma} \) through

Given the definitions and restrictions of the last para-

\[ \left[ \frac{\partial}{\partial \Gamma} \right] \left( \frac{\partial}{\partial \Gamma} \right) \frac{\partial}{\partial \Gamma} = dm \]

\[ \text{where the relationship among } dm, \left( \frac{\partial}{\partial \Gamma} \right), \text{ and } \left( \frac{\partial}{\partial \Gamma} \right) \text{ is given by,} \]

\[ dp = \left( \frac{\partial}{\partial \Gamma} \right) \left( \frac{\partial}{\partial \Gamma} \right) \]

\[ ds = \left( \frac{\partial}{\partial \Gamma} \right) \]

assets in the relevant country due to a change in \( m \), opposite in sign to changes in the currency value of outside assets. Central bank balance sheet, are restricted to be equal in size but as before changes in \( s \) and \( s \), the balance sheet items on the
\[
\begin{bmatrix}
\begin{array}{cccc}
\alpha_p & \beta_p & \gamma_p & \delta_p \\
\alpha_r & \beta_r & \gamma_r & \delta_r \\
\alpha_t & \beta_t & \gamma_t & \delta_t \\
\alpha_c & \beta_c & \gamma_c & \delta_c \\
\end{array}
\end{bmatrix}
\]

\[
\bar{0} = \begin{bmatrix}
\alpha_n & \beta_n & \gamma_n & \delta_n \\
\alpha_m & \beta_m & \gamma_m & \delta_m \\
\alpha_f & \beta_f & \gamma_f & \delta_f \\
\alpha_b & \beta_b & \gamma_b & \delta_b \\
\end{bmatrix}
\]

\[
\begin{bmatrix}
\begin{array}{cccc}
\frac{k}{\gamma} & 0 & 0 & -\delta \\
0 & \frac{k}{\gamma} & 0 & -\delta \\
0 & 0 & \frac{k}{\gamma} & -\delta \\
0 & 0 & 0 & \frac{k}{\gamma} \\
\end{array}
\end{bmatrix}
\]

**Table III**
In the current model an open market by the USCB not negative values.

that the permissible values of γ and λ have been expanded to include is completely identical to the coefficient matrix of Paper I except where γ > −∞, γ ≤ γ', the coefficient matrix of the current model

\[
\begin{bmatrix}
\frac{\partial}{\partial I}(\gamma - 1) - \gamma
\end{bmatrix} = \gamma
\]

\[
\begin{bmatrix}
\frac{\partial}{\partial I}(\gamma - 1) - \gamma
\end{bmatrix} = \gamma
\]

Now if we let

that (I-1)γ has an analogous interpretation.

due to an increase in international reserves held by the USCB and is the increase in the U.S. money supply in the hands of the public

\[
DR \left[ \frac{\partial}{\partial I}(\gamma - 1) - \gamma \right] - I = DR \left[ \frac{\partial}{\partial I}(\gamma - 1) \right]
\]

clear that,

should we have [\(\frac{\partial}{\partial I}(\gamma - 1) - \gamma\)]

supply of U.S. securities available to the public. The term

the net effect of the open market sales and the expansion of the

on the supply of U.S. securities available to the public.

banking system works to offset the effect of sterilization opera-

securities by (I-1)γ, the expansion of the U.S. Commercial

commercial banking system is able to increase its holdings of

high powered money expands by (I-1)γDR, and as a result, the U.S.
values of $X$ and $Y$ must be considered.

except for the relatively minor consideration that negative aspects caused by the presence of effective reserve requirements on the monetary authority are not affected by the appendix conclusions based on the model of Part I and under the additional restrictions outlined at the beginning of Part IV (A71) through (A74) which are stated fully in Chapter V and under Part II, this means that the assumptions implied by the model of Part I, the vector of differentials for the current model is completely

\[ \frac{\partial P}{\partial c} = \frac{c_p}{c}, \quad \frac{\partial P}{\partial c} = \frac{c_p}{c}, \]

has an analogous interpretation. If we let

\[ \frac{\partial P}{\partial c} \]

the supply of securities available to the public by the expansion of the money supply by $\frac{1}{B}$ leads to a total reduction
REFERENCES


System (mimeo., 1972).