

# EXCHANGE RATE POLICY AND THE DUAL ROLE OF EXCHANGE RATE MOVEMENTS IN INTERNATIONAL ADJUSTMENT

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## I. INTRODUCTION

**1. The Problem of International Adjustment and Its Relevance** Over the past few years, the foreign exchange value of the dollar has gradually emerged as a primary concern of United States monetary authorities. This growing concern is well illustrated by a sampling of *Wall Street Journal* headlines. For example, on January 10, 1978, a headline read "Federal Reserve Moves to Tighten Credit in Escalating Effort to Bolster U. S. Dollar."

By November 1 of that year, the dollar had depreciated 35 percent against the Swiss franc, with most of the depreciation occurring after midyear. Other major exchange rates also moved substantially against the dollar with the result that U. S. officials came under heavy pressure to intervene in the foreign exchange market to prevent a further decline in the value of the dollar. On November 1, U. S. authorities publicly announced their intention to support the dollar with appropriate monetary policies, including direct intervention in the foreign exchange market. This policy was reported on November 1 in the headline "Dollar Dilemma—Bold Currency Support Announced by the U. S. Raises Recession Risks." Although there was no official commitment to a particular rate, the decision represented a significant change of policy. Never since World War II had the U. S. publicly committed itself to intervene directly in the foreign exchange market on such a large scale to stabilize the exchange rate.

While exchange rates fluctuated considerably in the months following November 1, on the whole, the policy action succeeded in arresting the dollar depreciation. In July, however, the renewed depreciation of the dollar began to concern U. S. officials. This time the Federal Reserve responded directly to events on the foreign exchange market by raising the Federal funds rate. This action was reported in a July 7 headline reading "Tighter Credit Policy of Fed Facing Test on the Foreign Exchange Market."

What is the reason for this "dollar dilemma" as it was called in the November 1 headline? Why should a sudden large exchange rate movement concern policymakers? And even if there are valid reasons for concern, what prevents the monetary authority from pegging the exchange rate if it so desires? These are the questions the article seeks to address.

The sources of this policy dilemma stem from the operation of the international adjustment mechanism. This mechanism refers to the manner in which interaction among world goods markets and the foreign exchange market produces terms of trade, trade balance, and exchange rate responses to economic disturbances. It must be emphasized that the word *response* here refers not only to the immediate effects of disturbances but also to any persistence of the effects that may be produced by the adjustment mechanism itself.

An important issue related to persistence concerns how long it takes for adjustment to occur, and whether that adjustment is, in fact, stable. If non-interference in the foreign exchange market is to be an acceptable policy alternative, then the exchange rate must automatically converge to a stable equilibrium following a disturbance. Otherwise, the exchange rate may in fact require official management.

This article is partly concerned with examining potential adverse effects of allowing exchange rate movements to play a role in adjustment. Consequently, the body of this article is devoted to investigating the function of exchange rate movements in the adjustment process. It turns out that the source of the dilemma involved in holding the exchange rate fixed is easily recognized once the role of exchange rate movements in equilibrating the foreign exchange market is made clear.

Exchange rate movements are shown to function in two ways in the adjustment mechanism: first, by changing the relative price of domestic and foreign produced goods in international trade, and second, by revaluing stocks of domestic relative to foreign assets in portfolios. Analysis of the terms of trade effect of

exchange rate changes is contained in Part II, in a general discussion of the effect of exchange rate change on goods market equilibrium. The revaluation effect of exchange rate change is developed in Part III, where the focus is shifted to portfolio balance and foreign exchange market equilibrium.

The partial equilibrium results of Parts II and III may be condensed into two graphical relationships called the GM and FX curves, respectively. In Part IV, these two curves are brought together to show how the exchange rate and trade balance are determined in general equilibrium. The two roles of the exchange rate are thereby synthesized in a simple graphical framework which is then used to investigate some features of the adjustment mechanism as a whole. In particular, the free exchange rate mechanism is shown to automatically restore international economic equilibrium after a disturbance. The article concludes with a discussion of the sources of the policy dilemma faced by central banks operating under a flexible exchange rate.

## II. THE GOODS MARKETS

**2. A Macroeconomic Framework for Analysis of the Trade Balance** The national balance of trade is defined as the value of national exports (of goods and services) minus the value of national imports. The trade balance is also the excess of the value of national production in a given period over the value of national expenditure. To see this, note that (1) expenditure by domestic residents consists of purchases of domestically produced goods plus imports and (2) domestic output consists of goods sold to domestic residents plus exports. Therefore the difference between domestic output and expenditure is exports minus imports or the trade balance.

All goods produced provide owners of factor resources (land, labor, and capital) with income in wages, rent, and profit equal to the value of the output produced. Since the value of national output equals the value of national income, the trade balance can also be thought of as the difference between national income and national expenditure, which, of course, may be positive, negative, or zero.

This last relation has an important implication for analysis of the trade balance. A complete explanation of movements in the trade balance must be given in terms of factors affecting *total* national income or *total* national expenditure. For example, it is not sufficient to explain a movement of the trade balance into deficit by pointing to the fact that oil price rises have led to an increase in the value of oil imports. To the extent that the increased expenditure on oil is

offset by reduced expenditure on other goods, total national expenditure need not be affected. In other words, an increase in oil imports, if it is simply a consequence of individuals switching expenditure from food or clothes to gasoline, is not necessarily associated with an increase in total expenditure or a trade deficit.

**3. Tradable Goods Prices and the Terms of Trade** Sections 3 and 4 are devoted to establishing a relationship between the trade balance and the exchange rate that must hold in the context of goods market equilibrium. The relationship to be derived is represented graphically by the GM curve in Figure 1, where the U. S. trade balance is measured on the vertical axis and the dollar/pound exchange rate is measured on the horizontal axis.

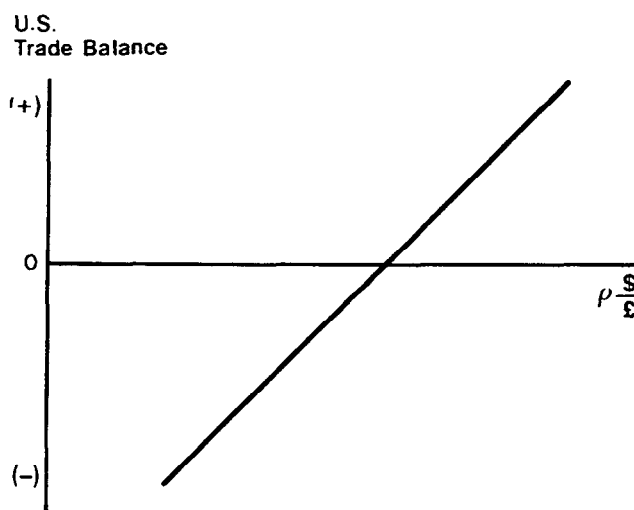


Figure 1

As shown in the graph, the GM curve will turn out to be upward sloping. The curve may be interpreted as follows. Let an exchange rate change occur for reasons outside the goods markets, e.g., due to speculation in the foreign exchange market. The maintenance of goods market equilibrium implies that an exchange rate rise (fall) is associated with a movement of the U. S. trade balance toward surplus (deficit).

It bears emphasizing that the determinants of the slope of the GM curve are entirely unrelated to the foreign exchange market. Since the GM curve involves only the goods markets, it may be called a partial equilibrium relationship. It is incomplete in the sense that it can only determine the trade balance for a given exchange rate. If the exchange rate is to be determined also, another curve needs to be provided. This second FX curve comes out of the

partial equilibrium discussion of the foreign exchange market undertaken in Sections 5 and 6. In Section 8 the two curves are superimposed on the same graph and the simultaneous determination of the trade balance and exchange rate is discussed in what is called general equilibrium, i.e., equilibrium analysis involving both foreign exchange and goods markets.

Proceeding with the analysis at hand, suppose the world consists of two countries, the U. S. and U. K. Residents in the U. S. produce corn and U. K. residents produce wool. Both goods are traded. The price of corn in dollars is denoted by  $\$P_c$  and the price of wool in pounds is expressed as  $\text{£}P_w$ . Further, let  $\rho \frac{\$}{\text{£}}$  be the exchange rate between the two currencies in dollars per pound.

Suppose the trade balance were in equilibrium at the initial prices. But now suppose the exchange rate rises due to foreign exchange speculation. At initial goods prices  $\$P_c$  and  $\text{£}P_w$ , the higher exchange rate raises the so-called commodity terms of trade, i.e., the relative price of wool in terms of corn. The terms of trade is the number of bushels of corn it takes to buy one bale of wool, i.e., bushels of corn given up to obtain one bale of wool, or simply  $\frac{\text{bushels of corn}}{\text{bale of wool}}$ . The terms of trade can be written using the three basic prices as

$$\frac{\text{£}P_w \cdot \rho \frac{\$}{\text{£}}}{\$P_c} = \frac{\frac{\text{pounds}}{\text{bale of wool}} \cdot \frac{\text{dollars}}{\text{pound}}}{\frac{\text{dollars}}{\text{bushel of corn}}} = \frac{\text{bushels of corn}}{\text{bale of wool}}$$

Note that the dollar and pound units cancel in the foregoing expression, verifying that it does yield the commodity terms of trade.

Because the relative cost of wool compared to corn is increased, world residents are induced to switch expenditure from wool to corn, and an incipient excess demand for corn and excess supply of wool develops at initial goods prices. Therefore, domestic currency goods prices must adjust to eliminate these incipient excess demands and supplies so as to maintain goods market equilibrium. In particular,  $\frac{\text{£}P_w}{\$P_c}$  (i.e., the ratio of the pound price of wool to the dollar price of corn) must fall to eliminate the incipient excess supply and demand at the higher exchange rate. But how are these price changes going

to affect national income, national expenditure, and the trade balance? This question is addressed next.

**4. Goods Prices and the Trade Balance** Suppose increased demand for domestic output raises domestic currency output prices. National expenditure depends on the level of national assets. If the domestic currency value of national assets rises proportionally with domestic output prices, then expenditure rises proportionally with income. However, one component of assets is domestic money which by definition has a fixed domestic currency unit value. Therefore, even if the domestic currency value of other components of wealth rises proportionally with output prices, the value of total assets rises less than proportionally with output prices. Consequently, a rise in the price of output raises national income more than national expenditure, and induces a trade surplus. Analogously, a price fall induces a trade deficit.

In the two-country model analyzed here, the U. S. trade surplus (deficit) must be associated with a U. K. trade deficit (surplus) of equal magnitude. This means that when  $\$P_c$  and  $\text{£}P_w$  adjust in response to an exchange rate rise, they must do so by moving in opposite directions, since only in this way can the associated trade imbalances remain equal and opposite in sign as required. This requirement, taken together with the requirement that  $\frac{\text{£}P_w}{\$P_c}$  must fall, implies that  $\$P_c$  must rise and  $\text{£}P_w$  fall to maintain goods market equilibrium following an exchange rate rise. It also follows that the U. S. trade account, consistent with goods market equilibrium at the higher exchange rate, moves into surplus matched by an identical movement of the U. K. trade balance into deficit.

Does the terms of trade return to its initial level after the exchange rate rise? Not if the residents of each country spend the predominant share of their income on goods produced domestically. Because the U. K. is now importing more than it exports, its residents now account for a larger share of world expenditure on goods than formerly. Therefore, world demand is shifted toward wool and away from corn. Since the quantities of these goods produced have not changed, the goods markets must have been brought into equilibrium by a rise in the relative price of wool in terms of corn. The terms of trade may be said to have moved in favor of U. K. residents and against U. S. residents as a result of the exchange rate rise, since the number of bushels of corn (U. S. product) that can be obtained in trade for a bale of wool (U. K. product) increases, and the number of bales of wool that can be obtained with a

bushel of corn decreases. In this sense, temporarily at least, U. S. residents suffer a lower standard of living as a result of the depreciation of the dollar and U. K. residents enjoy a higher standard of living.

U. S. residents traveling in Germany and Switzerland in summer 1973 or fall 1978 noted how the depreciation of the dollar against the D-mark and Swiss-franc produced an especially large and rapid deterioration in the foreign purchasing power of the dollar. But it is because their dollar incomes did not increase at home that the tourists rightly felt that they were less able to afford foreign goods and services. In other words, these U. S. tourists suffered a large adverse movement in the terms of trade brought about by a sudden depreciation of the dollar on the foreign exchange market.

Because U. S. residents suffer a reduced ability to consume foreign goods, they might pressure U. S. monetary authorities to forestall such a sudden dollar depreciation in an effort to prevent an adverse movement of the terms of trade. Yet, as will be made more clear in Section 5 and later in Section 8, such pegging of the exchange rate requires the monetary authority to give up control of the money supply. To the extent that money growth becomes inconsistent with domestic policy objectives, the monetary authority gets caught on the horns of a dilemma.

### III. THE FOREIGN EXCHANGE MARKET

**5. Financing a Trade Surplus or Deficit with a Fixed Exchange Rate** The determinants of national expenditure and national income are necessary but not sufficient to explain the trade balance. For example, the existence of a U. S. trade surplus means that the value of goods and services being purchased by U. K. residents from U. S. residents exceeds the value of goods and services being sold by U. K. residents to U. S. residents. In order to pay for, or *finance*, this trade imbalance, U. K. residents must be willing and able to run down their money balances and U. S. residents must be willing to accept corresponding increases in their money balances. That is, at the end of any period of time in which there is a U. S. trade surplus, a value of money wealth equal to the value of the trade surplus must flow from U. K. to U. S. residents. Put another way, a trade surplus (deficit) is necessarily associated with an inflow (outflow) of money. But U. S. residents generally choose to hold their money wealth predominantly in U. S. dollars while U. K. residents largely hold their wealth in pounds. Since the wealth transfer increases the relative share of world money wealth in the hands of U. S. residents, it raises the

demand for dollars relative to pounds and thereby creates an incipient excess supply of pounds and corresponding excess demand for dollars. It follows that in order to provide a complete explanation of the trade balance, the mechanism that eliminates these associated incipient excess supplies and demands for pounds and dollars must be explained. In other words, the mechanism by which the foreign exchange market clears must be explained.

The wealth transfer from U. K. to U. S. residents, by creating a net demand to trade pounds for dollars at the given exchange rate, puts downward pressure on this rate. If the monetary authorities of the U. S. and the U. K. desire to prevent the exchange rate from moving, then they can enter the foreign exchange market to accommodate the net desire to trade pounds for dollars.

Under the fixed exchange rate regime, the central banks are committed to passively supply dollars for pounds or pounds for dollars as required to prevent exchange rate movements. Suppose, for example, that the Bank of England desires to hold the exchange rate fixed. To the extent that the U. K. trade deficit (U. S. surplus) creates an excess pound demand for dollars, the Bank of England would passively accept the unwanted pounds and pay out dollars as required to prevent an exchange rate change. By providing the foreign exchange market (and ultimately U. S. residents) with the dollars desired in payment for the U. K. trade deficit, the Bank of England in effect finances the trade deficit. In this case the U. S. trade surplus is said to be financed by foreign official transactions. By passively accepting unwanted pounds in exchange for dollars, the Bank of England gives up control of the pound money supply, i.e., allowing it to fall because of conditions on the foreign exchange market.

The reduced rate of growth of the pound money supply necessary to stabilize the exchange rate may not be consistent with domestic goals of U. K. monetary policy such as price stability and stable real output growth. When this is the case, the Bank of England is caught on the horns of a dilemma in the following sense. If there is downward pressure on the dollar/pound exchange rate, in order to hold the exchange rate fixed, U. K. authorities will have to reduce the rate of growth of the pound money supply. A sharp sustained reduction in pound money growth could reduce real output growth. On the other hand, allowing the dollar/pound rate to fall, i.e., letting the pound suddenly depreciate, would cause an immediate worsening of the terms of trade for U. K. residents.

## 6. The Role of Exchange Rate Movements in Equilibrating the Foreign Exchange Market

In the absence of a commitment to fix exchange rates, central banks need not participate in the foreign exchange market. When this is the case, the exchange rate is said to be free. How does the foreign exchange market clear in this case? What eliminates the excess pound demand for dollars on the foreign exchange market associated with a U. S. trade surplus?

This section is devoted to establishing a relationship between the trade balance and the exchange rate that must hold in the context of foreign exchange market equilibrium in the absence of central bank intervention. The relationship to be derived is represented graphically as the FX curve in Figure 2. As shown in the graph, the FX curve is downward sloping. The curve may be interpreted as follows. Let the U. S. trade balance be disturbed due to events in the goods markets, for example, a switch of consumer tastes from U. S. to U. K. cars. The maintenance of foreign exchange market equilibrium implies that a U. S. trade balance movement toward deficit (surplus) is associated with an exchange rate rise (fall).

It bears emphasizing that the determinants of the slope of the FX curve are entirely unrelated to the goods markets. Since the FX curve involves only the foreign exchange market, it is only a partial equilibrium relationship. It is incomplete in the sense that it can only determine the exchange rate for a given trade balance. If the trade balance is to be determined also, the GM and FX curves must be brought together. This is done in Section 8 where the simultaneous determination of the trade balance and exchange rate is discussed in general equilibrium.

Economic agents holding portfolios of both foreign and domestic money carefully regulate the relative shares of different monies that they hold. The agents may be importers, exporters, multinational corporations, or individuals living on international borders. The desired portfolio shares vary according to individual circumstances. As discussed in Section 8, shares may also vary over time with the anticipated rate of depreciation, or appreciation, of domestic relative to foreign money. However, to avoid unnecessary complication, desired portfolio shares are here assumed fixed and agents are assumed to hold predominantly national money in portfolio.

To monitor his portfolio share, an individual must first calculate the total *value* of his money balances.

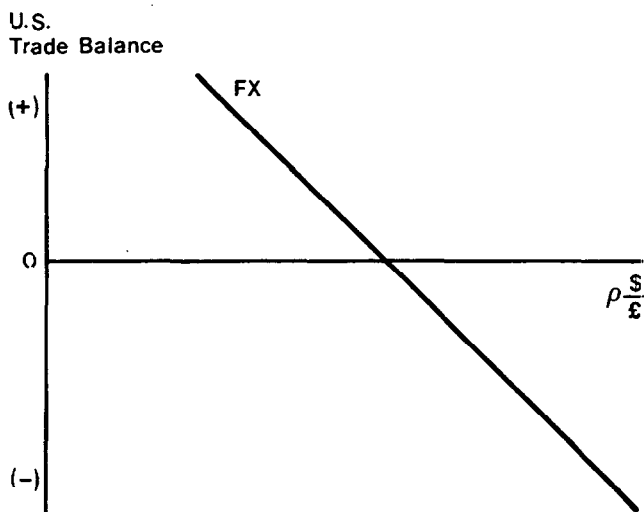


Figure 2

This requires that he choose a unit of account in which to measure his money wealth. It is important to emphasize that choice of this measure has no economic significance; it is equivalent to choosing between yards and meters to measure distance. Let the dollar be the unit of account. Suppose the individual has  $\$M$  dollars and  $\pounds M$  pounds in his portfolio. If the current market clearing exchange rate is  $\rho \frac{\$}{\pounds}$ , then the portfolio has a total dollar value of  $\$M + \rho \cdot \pounds M$ , which is the combined sum of dollars and pounds in portfolio valued in the dollar unit of account. It follows that the share of pounds in portfolio is  $\frac{\rho \pounds M}{\$M + \rho \pounds M}$ , which is the fraction of total portfolio value held in pounds. It also follows that a fall (rise) in the exchange rate  $\rho \frac{\$}{\pounds}$  lowers (raises) the *share* of pounds in total money wealth. An exchange rate fall reduces the value of pounds in portfolios throughout the world, thereby lowering the average share of pounds in world portfolios.

Now that the notion of portfolio share has been formally defined, it is easy to explain why asset holders care about portfolio shares. The above discussion abstracts from income earning assets, but, in general, individuals hold such assets. To the extent that individuals are risk averse, they maintain a diversified portfolio to minimize the overall risk for any acceptable average return on their portfolios. That is, they dislike "holding all their eggs in one basket." A rise in the current exchange rate raises the share of wealth in the "pound basket" so to speak. Therefore, when the exchange rate rises (the argu-

ment works in reverse for a fall) asset holders have incentive to sell off some pound assets for dollar assets to bring their portfolios back into balance.

The mechanism by which a free exchange rate equilibrates the foreign exchange market in a period of U. S. trade surplus works as follows. The wealth transfer from U. K. to U. S. residents lowers the average desired share of pounds in world portfolios. Therefore, to achieve foreign exchange market equilibrium, the average actual share of pounds in world portfolios must be reduced. But the argument above has demonstrated that an exchange rate fall does in fact reduce the average actual share of pounds in world portfolios. An exchange rate fall is said to clear the foreign exchange market when it brings the net excess pound demand for dollars to zero; in other words, when it leaves world residents just satisfied to hold the existing stocks of dollars and pounds.

In a period of U. S. trade surplus, a free exchange rate will be driven down until the foreign exchange market clears. It is important to emphasize that the exchange rate fall equilibrates the market by *revaluing* pounds in terms of dollars, thereby adjusting the relative value of pound and dollar money stocks until they are compatible with (1) the current distribution of money wealth between countries and (2) the average desired share of pounds and dollars in world portfolios.

Under a flexible exchange rate, a trade surplus or deficit is not necessarily financed as it is under a fixed rate. That is, no agent, private or official, need enter the market to voluntarily exchange pounds for dollars to clear the market. However, this does not mean that from time to time central banks or private agents do not choose to enter the market to stabilize the exchange rate. It has been a characteristic feature of the current experience with flexible exchange rates that central banks have frequently chosen to buy or sell foreign money to prevent or retard exchange rate movements in order to forestall sudden changes in the terms of trade that could produce hardship for domestic residents. Likewise, private agents may choose to vary the share of foreign and domestic money in portfolio to protect themselves against anticipated future exchange rate movements. Exchange rates have been influenced considerably by this type of official and private portfolio management. But the important point is that the fundamental free exchange rate equilibrating mechanism requires neither private speculation nor official intervention. It operates basically through the *revaluation effect* of exchange rate changes.

#### IV. AN ANALYSIS OF THE EXCHANGE RATE AND TRADE BALANCE IN GENERAL EQUILIBRIUM

7. *The Simultaneous Determination of the Exchange Rate and Trade Balance* As should be apparent by now, the exchange rate plays a dual role in the adjustment process. In Section 3, exchange rate movements were shown to affect the terms of trade (relative prices of traded goods), domestic currency goods prices, national income and expenditure, and the trade balance. In Section 6, for a given trade balance, it was shown how an exchange rate movement equilibrates the foreign exchange market by revaluing pound relative to dollar assets in portfolios. In one role, exchange rate movements function in the adjustment mechanism through their effects on relative goods prices. In the other role, the exchange rate functions through its effects on the relative value of foreign and domestic assets. In this section, both roles of exchange rate movements are brought together in one graphical framework to investigate the operation of the adjustment mechanism as a whole. This analysis extends that of previous sections by considering all three markets—U. S. goods, U. K. goods, and the foreign exchange market—simultaneously. Therefore, the analysis contained in this section is called general equilibrium, in contrast to the partial equilibrium analysis of earlier sections.

The basic result of Section 4 is that an exchange rate rise is associated with movement of the U. S. trade balance toward surplus under conditions of goods market equilibrium. This result is represented graphically in Figure 3 as the goods market clearing (GM) curve. The GM curve shows all trade bal-

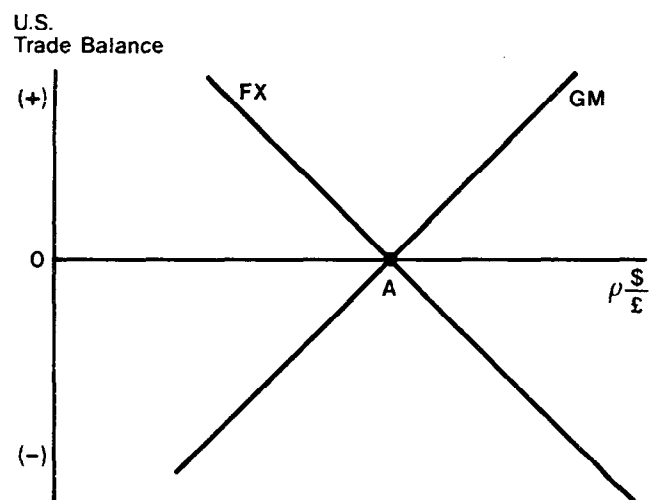


Figure 3

ance-exchange rate combinations consistent with equilibrium in the goods markets. The curve slopes upward indicating a direct relationship between the trade balance and the exchange rate. The curve says that a rise in the exchange rate must be accompanied by a rise in the trade balance to keep goods markets in equilibrium. This is so because, as outlined in more detail in Section 4, the exchange rate rise disturbs the terms of trade. Changes in the dollar price of corn and pound price of wool are then required to maintain goods market equilibrium. But these domestic currency price changes raise U. S. income and lower U. K. income relative to expenditure, and thereby move the U. S. trade balance into surplus.

The basic result of Section 6 is that an exchange rate fall is associated with movement of the U. S. trade balance toward surplus under conditions of foreign exchange market equilibrium. This result is represented graphically in Figure 3 as the foreign exchange market clearing (FX) curve, which shows all trade balance-exchange rate combinations consistent with equilibrium in the foreign exchange market. The downward slope of the curve indicates the inverse relationship between the trade balance and the exchange rate. For example, the curve says that a movement of the U. S. trade balance toward deficit must be accompanied by an exchange rate rise to maintain foreign exchange market equilibrium. This is so because, by analogy to the discussion in Section 5, the U. S. trade deficit implies a wealth transfer to U. K. residents which raises the demand for pounds relative to dollars in world portfolios. Given existing asset stocks, the increased demand for pounds relative to dollars in portfolio must be satisfied by an increase in the value of pound relative to dollar assets, i.e., an exchange rate rise.

The intersection of these curves (at point A) represents the trade balance and exchange rate that are consistent with both goods and foreign exchange market equilibrium in the current period. The intersection of GM and FX curves may be called short run or period equilibrium. Short run equilibrium does not require a zero trade balance. But Figure 3 is drawn so that the trade balance is indeed zero. When this is the case, no wealth is being transferred between U. S. and U. K. residents since the value of U. S. exports (U. K. imports) equals the value of U. S. imports (U. K. exports). Consequently, the exchange rate need not move. In the absence of further disturbances, this short run equilibrium can sustain itself indefinitely and so it is called a steady state or full long run equilibrium. Because no wealth changes hands, world residents are implicitly satis-

fied holding their stocks of money wealth. In this sense the long run equilibrium is also known as stock monetary equilibrium.

Now suppose the GM and FX curves intersect at point B in Figure 4, so that the U. S. trade balance is in deficit. How do the exchange rate and trade balance adjust to long run equilibrium? First, the short run equilibrium trade balance and exchange rate at point B cannot be self-sustaining because such a situation involves a transfer of money wealth from U. S. to U. K. residents. This wealth transfer causes the GM locus to shift up each period in which the U. S. trade balance is in deficit. To see this, remember that for a fixed exchange rate a transfer of money wealth from U. S. to U. K. residents raises U. K. resident assets relative to those of U. S. residents. This in turn raises U. K. national expenditure relative to income, and lowers U. S. national expenditure relative to income, thus tending to reduce the U. S. trade deficit gradually each period. Suppose the trade deficit is reduced by half each period. This is represented graphically by a vertical shift of the GM curve equal to half the distance between point B and the horizontal axis.

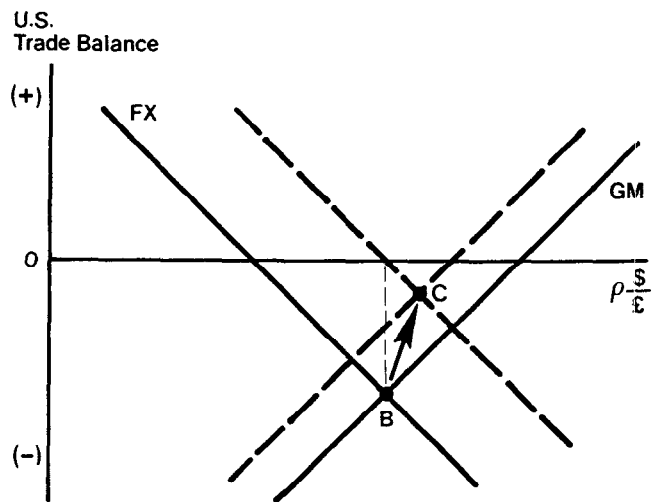


Figure 4

By how much does the FX curve shift? To answer this question, suppose the exchange rate were to remain unchanged. Now ask what trade balance would be consistent with foreign exchange market equilibrium. Any trade imbalance and wealth transfer would create an incipient excess pound supply (or demand) for dollars. So if the exchange rate were to remain unchanged, the trade balance would have to be zero for the foreign exchange market to remain in equilibrium. Therefore the FX curve



shifts vertically each period by the full amount of the distance between point B and the horizontal axis.

Putting the two shifts together shows that next period's short run equilibrium is established at point C in Figure 4. It follows by similar reasoning that the sequence of trade balance-exchange rate short run equilibrium points during the adjustment process lies on a positively sloped path cutting through B and C. It also follows that the trade balance converges gradually to zero as the exchange rate converges gradually to its long run level.

In Section 1, it was pointed out that feasibility of a free exchange rate policy requires that adjustment to a stable equilibrium be achieved automatically following disturbances. It is now possible to comment on this issue. The analysis outlined here suggests that, if the trade balance is not zero, wealth transfers associated with trade imbalance provide a force tending to bring the trade balance back to zero. That is, the system tends to return to long run stock monetary equilibrium after a disturbance. Therefore, the government can rely on the tendency of the free market adjustment mechanism to move toward a stable equilibrium. In other words, management of the exchange rate need not concern policy makers out of fear of instability of the free exchange rate.

**8. Two Illustrations of the Adjustment Mechanism** The graphical apparatus constructed in the previous section can be used to analyze two types of hypothetical disturbances to long run equilibrium characteristic of those that occur in international markets. The first of these originates in goods markets and, in terms of the model developed here, may be occasioned by, say, a shift of U. S. resident tastes from large domestic automobiles to smaller U. K. (foreign) cars. The second originates in foreign exchange or asset markets and involves, say, a shift of asset preferences from dollar assets to those denominated in pounds (foreign currencies).

*Disturbance 1—An Expenditure Shift* If U. S. resident preferences for goods shift toward U. K. output, an incipient excess supply of U. S. output and corresponding excess demand for U. K. output develops at the initial goods prices and exchange rate. At the initial exchange rate, U. K. prices rise and U. S. prices fall. This lowers U. S. income relative to expenditure and raises U. K. income relative to expenditure so that the goods markets come into equilibrium, with a U. S. trade deficit (U. K. trade surplus). In other words, the GM curve shifts down as shown in Figure 5.

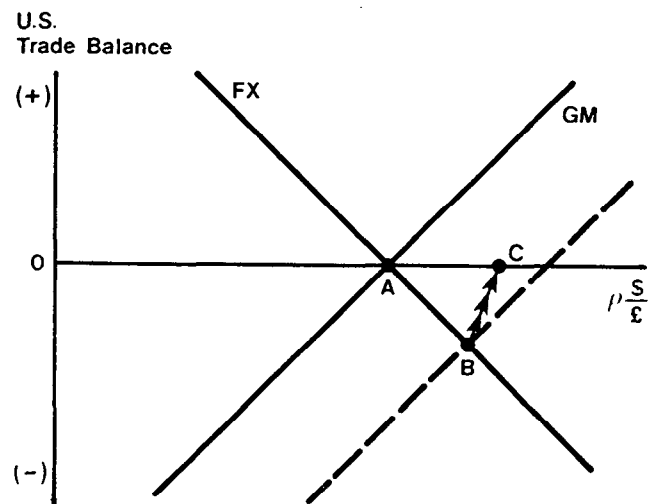


Figure 5

Since the disturbance does not initially affect the underlying determinants of the FX curve, that curve does not shift initially. Therefore immediately following the disturbance, the short run equilibrium point shifts from A to B, the exchange rate depreciates, and the U. S. trade balance moves into deficit. The movement down the initially fixed FX curve depicts a rise in the dollar value of pounds necessary to accommodate the increased relative demand for pound assets brought about by the wealth transfer from U. S. to U. K. residents through the U. S. trade deficit. With no further disturbances, the adjustment to long run equilibrium occurs along the positively sloped path between B and C. The adjustment path is positively sloped because throughout the adjustment process wealth is being transferred from U. S. to U. K. residents. Therefore the exchange rate must continually rise to accommodate the rising relative demand for pound assets.

The adjustment process terminates at point C, when the trade balance comes back into equilibrium. At that time, the dollar will have depreciated relative to the pound, and wealth will have been transferred from U. S. to U. K. residents through the series of U. S. trade deficits. The wealth transfer means U. S. money expenditure will have fallen and U. K. money expenditure will have risen. Trade balance equilibrium means national expenditure equals national income, which further implies that U. S. money income will have fallen and U. K. money income will have risen in the new long run equilibrium. Note that the terms of trade moves in favor of U. K. residents between points A and B when demand initially shifts toward U. K. goods. Then, as equilibrium moves



from B to C and the relative share of U. K. residents in world expenditure rises, the terms of trade moves further in favor of U. K. residents.

It should be emphasized that even though goods prices as well as the exchange rate have been assumed to be perfectly flexible, the adjustment to new long run equilibrium is not achieved by price movements alone. This would be possible only if individuals held no foreign assets. Then the FX curve would be horizontal at trade account equilibrium because an exchange rate rise would not put portfolios out of balance. In fact without diversification into foreign assets there would be no portfolio balance problem. In such a case, the new long run equilibrium would occur immediately on the shifted GM curve at trade account equilibrium. Since the trade account remains in equilibrium, no wealth transfer would take place. Therefore, national money expenditure and income would remain unchanged as would domestic currency goods prices. The exchange rate rise would be just sufficient to raise the terms of trade, i.e., the price of U. K. goods in terms of U. S. goods, to maintain goods market equilibrium.

On the other hand, when individuals do hold foreign assets, even though the disturbance originates in the goods markets, it is transmitted to the asset markets through the revaluation effect of the exchange rate change. In this case, as the exchange rate increase raises the price of U. K. goods relative to U. S. goods, it also moves portfolios out of balance by raising the dollar price of pounds. Hence, a U. S. trade deficit is required to maintain foreign exchange market equilibrium. The deficit initiates wealth transfers that take time to run their course. In short, because of the dual role of the exchange rate (i.e., changing terms of trade and revaluing assets) the disturbance in the goods markets produces wealth transfer effects which prolong the adjustment process even though goods prices as well as the exchange rate are assumed perfectly flexible.

*Disturbance 2—Revised Anticipations and the Policy Dilemma* As a second disturbance, suppose world residents receive information that the foreign exchange value of the dollar is likely to fall in the future. The anticipated future fall in the value of the dollar could be due to an anticipated future shift of world demand away from U. S. toward U. K. goods; or it could be due to a number of other possible disturbances to the equilibrium value of the dollar. But for the sake of the present discussion, the actual cause of the future fall in the equilibrium value of the

dollar does not matter. What matters is that this future fall in the equilibrium value is anticipated.<sup>1</sup>

It must be emphasized that this type of disturbance, operating as it does through anticipations, can be a predominant source of short run exchange rate movements for the following reason. Individuals holding both pounds and dollars in portfolio of course wish to protect themselves against a future fall in the value of one currency relative to another. Consequently, resources are expended in gathering information on likely future disturbances to the foreign exchange rate. Because the market uses this information efficiently, it tends to react to anticipated future disturbances to the exchange rate *before* they take place. To the extent that disturbances can be anticipated, short run exchange rate movements are likely to be predominantly influenced by shifts in portfolio preference induced by anticipated changes in the future equilibrium foreign exchange rate.

How does the market react to an anticipated fall in the foreign exchange value of the dollar? In order to avoid holding an asset which is likely to lose value, individuals try to sell dollars for pounds immediately. That is, individuals reduce the share of dollars in portfolio in advance of the anticipated fall in the value of the dollar. Therefore, at the initial exchange rate, an excess dollar demand for pounds develops on the foreign exchange market.

At the initial trade balance, the excess dollar demand for pounds must be accommodated by an exchange rate rise. This follows because, for given asset supplies, the desire to hold a greater share of wealth in pound assets must be satisfied by an increase in the value of existing pound assets relative to dollar assets. Consequently the FX curve moves right with a shift in portfolio preference toward pounds, as shown in Figure 6.

Now since the disturbance does not initially affect the underlying determinants of the GM curve, that curve does not shift. Therefore, when the disturbance occurs, the short run equilibrium point moves from A to B in Figure 6, i.e., the exchange rate rises and the U. S. trade balance moves into surplus. The movement along the initially fixed GM curve depicts the emergence of a U. S. trade surplus associated with an exchange rate rise. The reasons for this relation are discussed in detail in Section 3. In general terms, it is shown there that following an exchange rate rise, domestic currency goods price adjustments are required to restore consistency of

<sup>1</sup> Goodfriend [2] contains analyses of complete adjustment to various anticipated future disturbances.

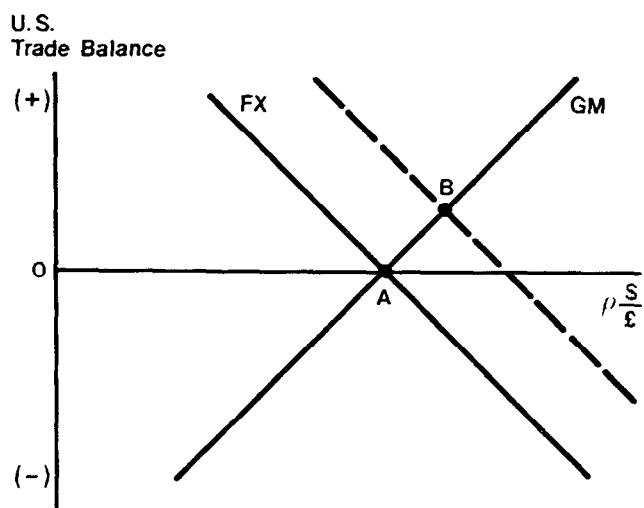


Figure 6

the terms of trade with goods market equilibrium. These goods price movements are in turn shown to have disproportionate effects on national income and expenditure. Because of these income and expenditure effects, goods price movements that bring the goods markets into equilibrium also move the U. S. trade balance into surplus.

Furthermore, the discussion in Section 3 shows that the exchange rate rise is associated with a rise in the relative price of U. K. output in terms of U. S. output units. In other words, the terms of trade move against U. S. residents and in favor of U. K. residents. It is also shown in Section 3 that this "speculatively" induced rise in the exchange rate tends to push U. S. goods prices up.

These last two consequences of the induced rise in the exchange rate bear directly on the policy dilemma faced by the world's central banks operating in a flexible exchange rate environment. Because of the dual role played by the exchange rate in the adjustment process—i.e., relative goods price and asset revaluation roles—the exchange rate rise required to clear the foreign exchange market affects goods markets and acts on the GM curve as well. As mentioned above, from the U. S. resident point of view the depreciation of the dollar is accompanied by a worsening of both the terms of trade and domestic inflation. Consequently, the U. S. monetary authorities in this case may come under pressure to stabilize the exchange rate to prevent its depreciation relative to the pound. But stabilizing the dollar requires that the U. S. authorities passively supply pounds for dollars to satisfy the excess demand for pounds that exists at the pegged exchange rate. If the U. S.

authorities insist on pegging the exchange rate, they must reduce the dollar money supply growth rate. U. S. monetary policy is thereby made subordinate to events in the foreign exchange market. The policy dilemma arises because the monetary policy necessary to stabilize the foreign exchange rate may not be consistent with domestic monetary policy goals.

The events of fall 1978 dramatically illustrate this policy dilemma. In the months prior to November, both U. S. money supply and the dollar price of foreign exchange had been rising at an increasingly rapid rate. Then after November 1, the U. S. monetary authorities, coming under intense pressure, announced a commitment to stabilize the foreign exchange rate. For the following five months the U. S. money supply grew much more slowly than before, thereby helping to precipitate the reduction in real economic growth that occurred in the second quarter of 1979.

## V. CONCLUSION

This article has outlined important features of international adjustment under a flexible exchange rate. Exchange rate movements have been shown to function in two distinct roles in the adjustment process. In the goods markets, exchange rate movements have been shown to affect relative goods prices (the terms of trade) and national income relative to national expenditure. In the asset or foreign exchange market, exchange rate movements have been shown to function by changing the relative value of foreign and domestic assets. These two functions of exchange rate movements have been synthesized in a simple graphical framework which displays the simultaneous determination of the trade balance and exchange rate. The framework has been used to investigate some characteristics of the international adjustment process as a whole.

The fundamental *dynamic* feature of the adjustment process has been shown to be the wealth transfer associated with trade account disequilibrium, which in general implies that the exchange rate and trade balance adjust gradually to a new long run equilibrium after a disturbance. Wealth transfer has also been identified as providing an automatic mechanism for exchange rate and trade balance adjustment to new long run equilibrium.

The article concludes with a discussion of the effect of anticipated future disturbances on the current exchange rate, trade balance, and terms of trade. It has been argued that short run exchange rate movements are likely to be dominated by disturbances

operating through anticipations. Therefore, the short run policy dilemma faced by world central banks operating under a flexible exchange rate has been discussed in the context of this type of disturbance.

The policy choice involves the extent to which exchange rate movements should be allowed to play a role in short run international adjustment. The dilemma arises because the monetary authorities must

give up control of money growth in order to prevent exchange rate movements. If the exchange rate is pegged, then money growth may become inconsistent with domestic policy objectives. But if the exchange rate is allowed to function in the adjustment process, the consequent terms of trade change and goods price movements could prove equally inconsistent with domestic policy objectives such as price stability and steady real economic growth.

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