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ECONOMIC PERSPECTIVES

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Interest rates and exchange rates under the Fed's new operating procedure: the uneasy marriage

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Movements in the trade-weighted value of the dollar have exhibited a greatly increased sensitivity to movements in U.S. short-term interest rates since the adoption of the Federal Reserve's new monetary policy operating procedure on October 6, 1979 (see chart). On that date, the Federal Reserve (Fed) changed its procedure to a system of so-called "reserve targeting" whereby it attempts to hit a target level of bank reserves estimated to be consistent with the desired level of the money stock.[1] Previous to that date the Fed had attempted to keep the federal funds rate within a targeted range believed consistent with the money stock's desired level.[2]

The relationship between interest rates and the dollar has been much more systematic since the change in operating procedure. Moreover, the relationship has been decidedly positive in the short run as well as over longer periods, which was not always the case in the past. This article will argue that there are strong reasons for believing that the Fed's shift to its new operating procedure can partially explain the more consistently positive relationship between domestic interest rates and the U.S. currency.

What are these reasons, and more generally, how does the observed relationship between interest rates and exchange rates mesh with various theories of exchange rate determination? It will be argued below that movements in the exchange value of the dollar respond to differences in real interest rates (that is, interest rates adjusted for expected inflation) and that these real interest rates are affected both by market perceptions of the Fed's operating stance and by the particular monetary policy operating target chosen by the Fed. This interpretation explains the relationship between nominal interest rates and the exchange rate over the past five years, as well as the shift in that relationship that seems to have occurred since the Fed implemented its new operating procedure in the fall of 1979. Moreover, it will be argued that this view is consistent both with the modern asset markets approach to exchange rate determination and with the more traditional theories of exchange rate movements.

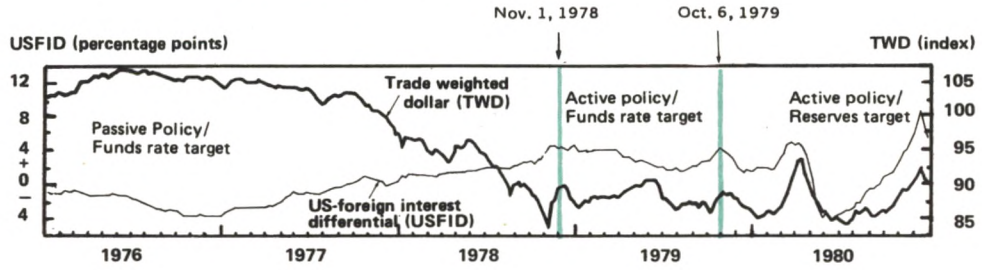
Interest rates and exchange rates—the theoretical relationship

The relationship between interest rates and exchange rates is a complex one which incorporates numerous behavioral parame-

[1]It will be helpful to remember that the new operating procedure adopted on October 6 is not a reserves operating procedure in the sense in which that term has generally been used—i.e., a total reserves targeting procedure. Because of lagged reserve accounting, under which the banks' current required reserves depend on their deposits two weeks ago, total reserves cannot be controlled closely in the current week. What the Fed can control is nonborrowed reserves, forcing banks to borrow any difference between required reserves and nonborrowed reserves at the Fed's discount window and thereby influencing the cost of reserves at the margin.

[2]Because the federal funds rate is the cost to a bank (at the margin) of obtaining funds to support loans to its customers, it influences interest rates on all other assets in the financial system. When the Fed operates on a federal funds rate target, it does so by supplying reserves to the banking system when the rate starts to rise above the target, and draining reserves from the banking system when the rate starts to fall below the target. Although under lagged reserve accounting there is a two-week delay in the transmission of disturbances from the federal funds market to conditions in the credit markets (and vice-versa), we will assume throughout this article that no such lag exists. Furthermore, we will speak of "the" interest rate as if such a representative rate existed. A technically more accurate analysis would examine the entire term structure of both interest rates and spot and forward exchange rates.

The trade-weighted dollar versus the U.S.-foreign interest differential, 1976-80



ters. Considered in isolation, a rise in interest rates in a given country would be expected to cause a rise in the value of that country's currency, simply because higher interest rates should attract capital from investors in other countries. However, when investors purchase the currency of a foreign country to take advantage of higher interest rates abroad, they must also consider any losses or gains they might incur due to fluctuations in the value of the foreign currency prior to maturity of their investment. Generally they cover against such potential losses by contracting for the future sale or purchase of a foreign currency in the forward market for foreign exchange so as to lock in a certain exchange rate on repatriation of their principal and interest.

Their actions in trying to profit from interest rate differentials between countries lead, in equilibrium, to the condition of so-called interest parity, in which any exchange rate gains or losses incurred by engaging in a simultaneous purchase and sale in the spot (immediate delivery) and forward (future delivery) markets are just offset by the interest differential on similar assets. Under these conditions, there is no incentive for capital to move in either direction, since the effective returns on foreign and domestic assets have been equalized (see box).

Interest parity can be upset by a sudden rise in domestic interest rates creating an opportunity for a shrewd and swiftly reacting investor to make a profit at little or no risk by borrowing money where it is cheap (the foreign market) and lending it where it is dear (the domestic market). This practice is known as interest arbitrage and it is engaged in frequently by the foreign exchange traders of large multinational banks and corporations.

In order to engage successfully in interest arbitrage, however, an arbitrager must accomplish four things before other traders have had time to react to the higher domestic interest rates and reestablish equilibrium. First, he must borrow at a lower foreign interest rate. Second, he must purchase domestic money with his newly borrowed foreign money in the (spot) foreign exchange market. Third, he must invest the domestic money at the higher domestic interest rate. Fourth, and finally, he must contract in the forward market for a future sale of his domestic currency for foreign currency at maturity of his investment in order to repay his loan.

As many investors simultaneously attempt to take advantage of the opportunity for profit occasioned by the rise in domestic interest rates, the interest and exchange markets typically react in the following manner: foreign interest rates rise as arbitragers attempt to borrow foreign currency; the domestic exchange rate rises as arbitragers attempt to convert foreign into domestic currency in the spot market; the domestic interest rate falls (although not back to its original level) as arbitragers invest their funds in the domestic credit market; and the forward price of the domestic currency falls as arbitragers attempt to sell the domestic currency in the forward market in order to pay off the foreign loans and retain the difference as profit. These actions will all work to reestab-

The interest parity condition

The interest parity condition simply relates interest rates and spot and forward exchange rates so there is no advantage to investing in one currency as opposed to another. It can be developed very simply by comparing the returns an investor would earn at home and abroad. Let E equal the spot exchange rate in deutsche marks (DM)/dollar. Also let R_f and R_h equal the German (foreign) and U.S. (home) interest rates on 12-month certificates of deposit (CDs) both expressed as a fraction (i.e., .06 instead of 6 percent), and assume that a U.S. investor has $1.00 to invest that he could put in either German or U.S. CDs.

If he places his dollar in the U.S. CD, he will have $1 + R_h$ at the end of 12 months.

If he places his money in the German CD, he must first convert his one dollar in the spot foreign exchange market. This will give him E DM. He must then invest the E DM in a German CD, which will give him $E(1 + R_f)$ DM at the end of 12 months. However, if he wants to be certain of his return in dollars, he must contract for exchange of his DM for dollars in the forward market. This will give him $E(1 + R_h)(1/F)$ dollars at maturity.

If there is to be no incentive for the investment in Germany, his dollar return on the investment there must be the same as his dollar return on the investment in the United States. Thus, for "parity,"

$$1 + R_h = E(1 + R_f)(1/F), \text{ or}$$

$$F/E = \frac{1 + R_f}{1 + R_h}.$$

This can be simplified further by subtracting one from both sides of the equation

$$1 = E/E = \frac{1 + R_h}{1 + R_h},$$

so that

$$F/E - E/E = \frac{1 + R_f}{1 + R_h} - \frac{1 + R_h}{1 + R_h} \text{ or}$$

$$\frac{F - E}{E} = \frac{R_f - R_h}{1 + R_h}.$$

Since $1 + R_h$ is not very different from one, we can approximate this condition as follows:

$$\frac{F - E}{E} \cong R_f - R_h.$$

In addition, we would expect that the forward rate (F) should be a reflection of the market's expectations about the spot exchange rate one year from now. If this were not the case, speculators would move the rate until it did reflect accurately their expectations of the future. For example, if an investor thought that the 12-month forward rate on DM were below what he was fairly sure would be the actual spot exchange rate 12 months from now, he could earn a profit by contracting in the forward market for purchase of DM. Then, after 12 months, he could exercise his contract by purchasing DM at the previously agreed upon forward rate, and immediately sell them at the current (higher) spot rate for a profit. If many speculators were attempting similar actions, this would drive up the forward rate until it accurately reflected market expectations. To the extent that the forward rate is a reflection of market expectations, the interest parity condition may be written as follows:

$$\frac{\text{Expected (E)} - E}{E} \cong R_f - R_h \text{ or}$$

$$\text{expected } \%\Delta E \cong R_f - R_h.$$

This is also known as the condition for uncovered interest parity since an investor would expect the same earnings even if he did not contract for sale in the forward market at maturity of his investment which should be the case in equilibrium.

lish interest parity and eliminate the opportunity for profit. Because exchange and money markets are connected by sophisticated telephone, telex, and computer hook-ups, the reestablishment of interest parity takes only a matter of minutes.

When the arbitraging has been completed, the ultimate results of the initial rise in domestic interest rates will be: higher domestic and foreign interest rates, a higher domestic exchange rate, and a *lower* foreign exchange rate.[3] In other words, even though increases in the home country's interest rate are associated with appreciation in its currency, increases in the foreign country's interest rate may be simultaneously associated with a depreciation in its currency.

Although this result may seem paradoxical at first, it is a necessary consequence of the nature of world capital markets today. The so-called Eurocurrency markets, where much of such arbitrage takes place, ensure that all of the world's money markets are highly integrated. With free movements of international capital, pressures are generated for fairly synchronous movements in interest rates. Under these circumstances a positive relationship between domestic interest rates and the price of the domestic currency necessarily implies an inverse relationship between the foreign country's interest rate and the price of its currency. Thus, if the deutsche mark/dollar exchange rate is appreciating with rising U.S. interest rates, the dollar/deutsche mark exchange rate is depreciating by definition, even though German interest rates are rising as they are pulled up to some degree by U.S. rates.

On the other hand, the relationship between the interest *differential* and exchange rates should be consistent. That is, if the interest differential favoring the United States (the U.S. rate minus the foreign rate on similar assets) is increasing, we should expect an appreciation of the dollar and a depreciation of the foreign currency.[4]

However, movements of interest rate differentials and exchange rates have not always displayed such consistency (see chart). As can be seen, the trade-weighted value of the dollar declined from mid-1976 to late 1978 even though the interest differential[5] favoring the United States rose continuously throughout this period. Then, in 1979, after the change in Federal Reserve operating procedures, this relationship reversed and the interest differential and the trade-weighted dollar rose and fell together.

A theory of the determination of nominal interest rates and exchange rates capable of resolving this seeming anomaly must include two essential elements. The first is a description of the mechanism by which expectations, especially of future inflation rates, influence the determination of nominal interest rates and exchange rates. The second is an explanation of the role of the Fed's operating target in the formation of these expectations. To understand these two keys to the process by which interest rates and exchange rates are determined, it is useful to begin by examining the leading alternative theories of exchange rate determination.

Theories of exchange rate determination

In addition to the simple interest parity theory, it is possible to identify four other

[3]Whether this scenario is played exactly according to script depends critically on the various elasticities of supply and demand in the spot and forward exchange markets and in the national money markets. Elasticities in the exchange market will depend largely upon the demand of exporters and importers for forward cover, the availability of funds for speculative purposes, and the certainty with which expectations are held, as expressed by the variance of market participants' subjective probability distributions.

[4]This analysis assumes that movements in U.S. rates determine the movement of the U.S.-foreign interest differential. There are two primary reasons why this is a plausible assumption. First, the large size of the U.S. capital market makes it more impervious to forces from outside. Second, the prevalence of the dollar in international trade and in the Eurocurrency markets makes U.S. monetary conditions the prime force internationally.

[5]The interest differential is the difference between the U.S. rate on 90-day certificates of deposit and a weighted average of foreign interest rates on similar 90-day money market instruments. The countries entering into the weighted average are the same as those used in computing the trade-weighted value of the dollar (the Group of 10 countries plus Switzerland).

major theories of exchange rate determination: (1) the purchasing power parity theory, (2) the balance of payments theory, (3) the monetary approach to exchange rate determination, and (4) the asset markets or portfolio balance approach. Although, when considered in isolation, each may project a different course for exchange rates, each sheds some light on the relationship between interest rates and exchange rates and provides some insights into the formation of market expectations.

Purchasing power parity

The theory of purchasing power parity in its simplest form says that the exchange rate must change so as to equate the prices of goods in both countries in terms of a single currency. Thus, if the prices of German goods rose relative to the prices of U.S. goods, the German mark should depreciate (cost fewer dollars) to keep the dollar prices of goods in Germany the same as the dollar prices of identical goods in the United States. Otherwise, arbitragers would have an incentive to purchase goods in the United States and sell them in Germany until these prices were again equalized.

There are some obvious weaknesses of the purchasing power parity doctrine. First, it assumes that goods are identical across countries and are easily transported for arbitrage purposes. This is obviously not the case, for some goods such as houses are not traded at all. In addition, in order to compare the prices of dissimilar goods we have to rely on price indices, and it then becomes a question of which index is most reflective of goods traded between the two countries. However, the main implication of the purchasing power parity theory is quite useful, and remains at least approximately valid over the long run: If a country's domestic rate of inflation remains higher than that of its trading partners for a long period of time, that country's currency will tend to depreciate so that it does not price itself out of export markets. The purchasing power parity doctrine is not, however, a good predictor of short-run exchange rate movements.

The balance of payments approach

The balance of payments approach to exchange rate determination is quite straightforward. It says that if country A is buying more goods and services from country B than it is selling to country B, then residents of A will be attempting to obtain more of B's currency than residents of B are attempting to obtain of A's currency. This will cause an excess supply of A's currency relative to B's and a decline in its relative price. Thus, the balance of payments theory would predict exchange rate depreciation for countries with deficits in their international transactions and appreciation for those with surpluses.

The major problem with the balance of payments theory is that it is difficult to define unambiguously what constitutes balance in a country's international payments. Consequently, countries have resorted to classifications of their international transactions into the trade account (which encompasses trade in goods only), the current account (which includes goods and services and interest payments), and various arbitrary breakdowns of the capital account (which encompasses trade in financial assets).[6] None of these accounts by itself can explain movements in the exchange rate, but it is generally accepted that the current account balance will influence the exchange rate directly over the long run, and through its impact on expectations in the short run.

The monetary approach

The monetary approach emphasizes the role of the demand for and supply of money

[6]The controversy over balance of payments accounting seems to stem more from the inability to define money than from the inability to define the balance of payments. If international transactions could be defined on an actual "payments" basis, the balance of payments approach becomes simply the flow counterpart of the monetary approach which focuses on the stock of a particular asset, i.e., money.

in determining the exchange rate. The exchange rate is considered to be the relative price of national monies, and movements in exchange rates will be such as to make the stocks of national monies willingly held. Thus, if there is an excess supply of money in country A, part of that excess supply will be forced upon the exchange markets as individuals in country A collectively attempt to rid themselves of their unwanted money holdings. This will cause a depreciation in country A's currency. Consequently, an excessive rate of growth of a country's money supply relative to growth in its demand for money (which is based in part on its growth in real output) should manifest itself in currency depreciation.

In practice, the demand for money is an unobservable quantity which is strongly influenced by expectations. Thus, even though we may know what is happening to the money supply, unless we are equally sure of what is happening to money demand, it is difficult to predict accurately the direction of exchange rate changes.

The asset markets approach

The final approach, the asset markets or portfolio balance approach, emphasizes the fact that national currencies are one among an entire spectrum of real and financial assets that economic agents may desire to hold. Each asset, including national currencies, offers a combination of risk and expected return that is based partly upon anticipations about the future as well as on current economic conditions. Shifts in these perceived risks and returns induce financial agents to reallocate their portfolios between assets denominated in different currencies and, thus, bring about changes in the exchange rate.

The exchange rate is seen as being jointly determined with other economic variables such as national output, the trade balance, and the price of other goods. Moreover, it is primarily through the medium of expectations that exchange rates are affected, and other variables such as the current account balance or the rate of monetary growth influence the exchange rate primarily to the extent that they affect expectations. Over the long run, these factors will affect the exchange rate directly, but the effect of expectations will usually dominate at any given time. The asset markets approach is consistent with the actual behavior of the financial markets and with the interest parity relationship discussed earlier. In fact, most economic models of exchange market behavior which follow this approach take the interest parity condition as their point of departure.

Real interest rates and expectations

The same factors that are adduced in the above theories of exchange rate determination also enter into the determination of domestic interest rates. That is, domestic rates of inflation, rates of monetary growth, international monetary flows (the balance of payments), risk, and real return all affect interest rates as well as the domestic exchange rate. There is a fundamental reason why this should be so. The interest rate is the price of money services over a certain period of time, or the price of credit. On the other hand, the exchange rate is the relative price of two national money *stocks* at a given point in time. In a free market, the relative prices of any two stocks of assets automatically include information on the implicit flows of services from those assets. For example, if the ratio of the prices of two automobiles is 2 to 1, this implies that the market has determined the present value of expected services from one automobile to be twice that from the other. If the interest rate is determined in a free market, we would expect it to incorporate all information relevant to the expected flow of services from a given national currency. If exchange rates are similarly freely determined, we would expect that same information to be incorporated in them.[7]

[7]If information were perfect and there were no intervention in either market, one could argue that the relationship between interest rates and exchange rates should be *exact*. Any explanation of deviations from this relationship must therefore be sought in either governmental policies or informational deficiencies.

The problem is that exchange rates and interest rates are not always market determined. However, when some outside interference prevents *nominal* interest rates from adjusting to all of the relevant risk/return information pertinent to the holding of a given asset, the adjustment to that new information is absorbed by an adjustment of the market's assessment of the *real* rate of return on that asset. This can be more clearly understood if we examine the components of the nominal interest rate.

Economists have long accepted the hypothesis that nominal interest rates include both a real rate of return and an inflation premium to compensate lenders for the expected loss of value of their principal. This can be expressed as:

$$R = r + I^e$$

where R is the nominal rate of interest, r is the real rate of interest, and I^e is the expected rate of inflation. Thus, a change in nominal interest rates may arise from either of two sources: a change in the real interest rate or a change in the expected rate of inflation.[8] Likewise, if the nominal rate is fixed, a change in inflationary expectations implies a change in the real return on the asset concerned.

The importance of these ideas for the determination of the exchange rate can be seen by examining the interest parity condition in more detail. The simple (uncovered) interest parity condition suggests that the rate of change of the exchange rate equals the nominal interest differential (see box for an explanation):

$$\text{expected } (\%\Delta E) = R_f - R_h$$

where E is the foreign currency price of the home currency, and the subscripts f and h denote foreign and home, respectively. Using the above relationship between nominal and real interest rates, interest parity may be rewritten:

$$\text{expected } (\%\Delta E) = (r_f + I_f^e) - (r_h + I_h^e) \text{ or,}$$

$$\text{expected } (\%\Delta E) = (r_f - r_h) + (I_f^e - I_h^e).$$

This says that changes in the exchange rate should be the sum of differences in the real rates of interest and differences in expected inflation rates. In long-run equilibrium, real rates of interest are equalized by international capital flows, $r_f - r_h = 0$, and we have simply that

$$\text{expected } (\%\Delta E) = I_f^e - I_h^e$$

which is nothing more than the purchasing power parity theory of exchange rates.

Taking this one step further, if one incorporates into the analysis a monetarist assumption about the determinants of inflation, the monetary approach to exchange rate determination also falls out of the interest parity condition. For example, if the rate of price increase is assumed to equal the excess of the rate of monetary growth over the rate of growth of money demand ($I^e = \%\Delta MS - \%\Delta MD$),[9] then the parity condition is

$$\text{expected } (\%\Delta E) = (\%\Delta MS_f - \%\Delta MD_f) - (\%\Delta MS_h - \%\Delta MD_h).$$

This relationship expresses the monetary approach to exchange rate determination in its most rudimentary form and illustrates the fact that both this theory and the theory of purchasing power parity are theories of long-

[8]Technically, the nominal interest rate should incorporate a risk premium as well so that $R = r + I^e + Z$, where Z is a composite risk premium (one could argue that the variance of I^e should also be included in Z). Thus, any change in perceptions of Z due to political events or other occurrences should also be reflected in changes in either R or r or both depending on the authorities' willingness to let R adjust to market forces.

[9]This is a simple monetarist proposition based on the quantity equation. If $MS \cdot V = PY$ where P is the price level and V is velocity, taking logarithms and differentiating both sides gives: $\dot{M}S + \dot{V} = \dot{P} + \dot{Y}$, where the dot signifies percentage rates of change. If $\dot{V} = 0$ (constant velocity) and the real income elasticity of demand for money were one ($\dot{MD} = \dot{Y}$), then $\dot{P} = \dot{MS} - \dot{MD}$.

run equilibrium (based on the assumption that $r_f = r_h$).

The balance of payments approach to exchange rate determination is based on the fact that excess demands for and supplies of foreign goods create demands for and supplies of foreign currencies. However, this approach has been criticized for focusing narrowly on international transactions in goods and services and overlooking the international transactions in financial assets included in the capital account. If the balance of payments were properly defined to reflect the actual monetary flows through the foreign exchange market, this approach would be very similar to the monetary approach, since a balance of payments surplus or deficit, conceptually, *is* a monetary flow. Any supply of a currency to the foreign exchange market which influences the exchange rate should also affect interest rates since that money is no longer available for domestic lending.

All of these ideas are synthesized in the asset markets approach to exchange rate determination. The asset approach incorporates relative rates of price increase (purchasing power parity), relative rates of monetary growth (the monetary approach), and balance of payments phenomena into the exchange rate determination process through their impact on anticipated risks and returns to various financial assets.

Moreover, by emphasizing the jointly determined nature of interest and exchange rates and the role of expectations in influencing both, the asset market approach focuses much more on the short run and reintroduces the role of real interest differentials, since these real returns are residuals that incorporate both relative risks and relative nominal returns (see footnote 8). If nominal interest differentials adjust to changes in the perceived real differentials, then changes in relative nominal rates should cause exchange rate movements consistent with the asset markets approach. Any inconsistencies in this relationship should result either from imperfect information or from government intervention into one or the other of the various markets. It is the latter which explains the changes in the nature of the nominal interest/exchange rate relationship since the Fed implemented its new operating procedure.

The role of the Fed in the formation of expectations

From the above discussion it should be clear that expectations about the future course of economic policy play a critical role in the determination of both interest rates and exchange rates. Through its ability to influence interest rates, the Fed plays a key role in the formation of these expectations, and the reactions of both the money and foreign exchange markets will be quite different depending on how the financial markets view the Fed's actions. For purposes of exposition, let us identify the two extreme types of Federal Reserve policy stances as perceived by the financial markets: an "active" policy of intervening in the money and/or foreign exchange markets to impose a prescribed growth path on the economy and a "passive" policy of accommodating demands emanating from the private sector. When the market perceives Fed policy as active, movements in the money supply figures or the current account balance may generate a totally different set of expectations than would result under perceptions of a passive policy.

Likewise, the extent to which interest rates themselves incorporate these expectations and thus reflect current information depends on the extent to which interest rates are market determined as opposed to government administered. This will in turn depend on the intermediate target of Federal Reserve policy.

Thus, when the operating target of monetary policy is the federal funds rate, any influence of expectations on nominal interest rates may be attenuated by actions of the Fed to keep the funds rate within a specified range. On the other hand, if the Fed were to set a level of bank reserves and let the funds rate find its market-determined level, changes in expectations should be fully reflected in

movements of this key interest rate.[10]

In order to clarify these ideas, and isolate various effects on the financial markets, Fed policy is characterized in the accompanying table according to market perceptions both of its basic stance and of its actual operating target. If new information becomes available that suggests worsening inflation—e.g., an unexpected increase in the rate of monetary growth (% Δ MS)—the reactions should be as depicted. Although there are other possible positions in between the ones shown, focusing on extreme cases makes clearer the forces generated by policy shifts.

Possible responses to information on increased monetary growth (given $R = r = I^e$)

Operating target	Perceived policy stance: Active	Perceived policy stance: Passive
Federal funds rate	ambiguous responses	I^e – increase R – no change r – decrease E – depreciate
Reserves	I^e – no change R – increase r – increase E – appreciate	ambiguous responses

In the extreme, market perceptions of a truly active policy imply no change in inflationary expectations (% Δ MS = > Δ I^e = 0) even when there is news of developments that otherwise would be inflationary. In other words, the news leads the public to anticipate strong Fed countermeasures rather than worsening inflation. In contrast, when the Fed is perceived as passive, new inflationary information becomes fully incorporated into inflationary expectations. (% Δ MS = > Δ $I^e \neq 0$)

Let us further consider two types of operating targets: a federal funds rate target and a reserves operating target. Under a federal funds rate target, the Fed modulates movements in the rate by adding reserves to or draining reserves from the banking system. The *polar case* of such an operating procedure would be to fix the federal funds rate at some constant, predetermined level (Δ R = 0).

Under a reserves operating target, the Fed tries to hold the growth of bank reserves to a prescribed growth path and allows the federal funds rate to fluctuate according to market demand for reserves. Under this procedure nominal interest rates would react to incorporate any new information relevant to determining future risks and returns (Δ R market determined).

One additional matter needs to be clarified. An active policy using a federal funds rate target is somewhat ambiguous. If the policy is truly active it will require moving the federal funds rate to a new (higher, in the example above) target when new information becomes available, thus raising the real return on assets and yielding results similar, if not identical, to those resulting from an active policy with a reserves target. On the other hand, if credit demands in the economy are stronger than expected, the Fed may fail to raise the rate sufficiently to prevent engendering more inflationary expectations. The movement in the real rate will depend on the magnitude of the policy action relative to changes in credit demands.

Thus, market perceptions of the Fed's policy stance, by influencing the response of inflationary expectations to new information, and the Fed's operating target, by influencing the immediate response of nominal interest rates to new information, should jointly influence real interest differentials and the exchange rate. Moreover, because these factors determine whether real and nominal interest rates vary directly or inversely with one another, they should also determine the relationship between nominal interest rates and the exchange rate.

Interest rates and exchange rates, 1976-80

What light does the above framework shed on movements in interest rates and exchange rates in recent years? First, two dis-

[10]Under the current system of "lagged reserve accounting" this is not actually the case, since demand in the market for federal funds is established by conditions two weeks in the past.

tinct shifts in Fed behavior conveniently divide the period since 1976 into three distinct subperiods. The first important shift in Fed behavior occurred on November 1, 1978, when the Carter administration adopted a policy of active dollar support. Because this was widely viewed by the money markets as a shift to a more active monetary policy, the Fed's perceived policy stance prior to that date can be characterized as "passive" and subsequent to that date as "active."

The second major behavioral shift occurred on October 6, 1979, when the Fed moved from a federal funds rate operating target to a nonborrowed reserves target. The three subperiods between January 1976 and December 1980 may thus be characterized as follows:

Period	Policy stance	Operating target
1/76 - 10/78	Passive	Federal funds rate
11/78 - 9/79	Active	Federal funds rate
10/79 - 12/80	Active	Nonborrowed reserves

The entire period has been one of almost continuously increasing monetary growth and inflationary expectations, marked by sharp movements in interest rates. Using the relationships in the table on page 11, the correlation between nominal and real interest rate differentials can be classified as follows:[11]

Period	Correlation between movements in real and nominal interest rate differentials
1/76 - 10/78	Negative
11/78 - 9/79	Ambiguous
10/79 - 12/80	Positive

In the first period, the trade-weighted dollar declined almost continuously. According to our theory, this should have been caused by a declining real interest differential. Moreover, based on our characterization of Fed policy during this period, we would expect an inverse relationship between real and nominal interest rates in the U.S., thus implying a rising nominal interest differential. This was in fact the case, and the trade-weighted dollar moved inversely with the nominal interest differential. Movements in the value of the dollar and in the nominal interest differential diverged because the Fed prevented nominal interest rates from incorporating fully the rising inflationary expectations, thereby lowering the market's evaluation of the real return on U.S. financial assets.

Movements in nominal U.S. interest rates and the trade-weighted dollar showed a somewhat different pattern in the period between November 1978 and October 6, 1979. In the first half of this period, both the nominal interest differential and the trade-weighted dollar remained relatively flat, and manifested a slight inverse relationship to one another. The two variables declined together from June to August 1979, and then, in August and September, the interest differential rose while the dollar fell slightly. These movements are also consistent with the interpretation given above. As was argued in the previous section, the active monetary policy with a federal funds rate target that characterized this period could result in either a positive or negative relationship between real and nominal rates depending on the appropriateness of the federal funds rate

[11]This relationship has been tested empirically for the presence of structural shifts. When estimated in first difference form with slope dummy variables, the estimated relations for the three periods are:

$$\text{Period I: } \Delta TWD = -.703\,\Delta USFID \quad (-2.27)$$

$$\text{Period II: } \Delta TWD = .261\,\Delta USFID \quad (2.04)$$

$$\text{Period III: } \Delta TWD = .632\,\Delta USFID \quad (1.07)$$

$R^2 = .14$ DW = 1.75 F = 21.94

where Δ's signify first differences of the variables and TWD and USFID are the trade-weighted dollar and the U.S.-foreign interest differential, respectively. The numbers in parentheses are t-statistics. The t-statistics for periods II and III test the statistical significance of the point estimates of incremental slope changes in each of those periods. The low t-statistic for period III can be explained by the theoretical equivalence of periods II and III if the Fed were choosing the "right" funds rate. See William L. Wilby, "Federal Reserve Policy and the Interest-Exchange Rate Relationship: 1976-1980," unpublished manuscript, July 1981.

chosen by the Fed. The ambiguous relationship between movements in the interest differential and the dollar reflected this ambiguity, as exchange rates responded to differing market perceptions of both policy and the outlook for inflation.

Finally, in the period from October 1979 to December 1980, there was a decided shift in the nature of the relationship between U.S. and foreign nominal interest rates and the trade-weighted dollar. Movements in both became more volatile, and the relationship between them was distinctly positive. During this period Fed policy was essentially active, and the Fed's operating target shifted from the federal funds rate to nonborrowed reserves. Consequently, real interest differentials moved in the same direction as nominal interest differentials, and the latter moved in the same direction as the exchange rate. This positive relationship, in turn, resulted from the fact that nominal interest rates were allowed to reflect more efficiently market information with respect to both real rates of return and inflationary expectations, the most important variables affecting exchange rates.

Conclusion and outlook

The exchange rate normally moves in response to real interest differentials. The nature of the relationship between *nominal* interest differentials and the exchange rate depends on the correspondence between real and nominal interest rates. This correspondence depends critically on Fed policy.

Market perceptions of the Fed's monetary policy stance, in conjunction with its operating target, determine movements in real interest rates and, consequently, the relationship between nominal interest rates and the exchange rate. The active policy stance and nonborrowed reserves operating target in effect since October 6, 1979, have tightened considerably the relationship between the nominal interest differential and the exchange rate.

Do these observations shed any light on the future direction of the relationship between U.S. nominal interest rates and the exchange rate of the dollar? To the extent that the Fed modifies its targeted reserve path to cushion any decline in the federal funds rate, it will have implicitly retreated in the direction of a funds rate target. If this occurs, the positive relationship between the dollar and interest rates might be upset again depending on whether the actual rate is above or below the rate consistent with the Fed's monetary goals. Moreover, to the extent that other central banks modify their own interest rate policies in an attempt to move the real rates of return on their domestic assets, the positive relationship might be distorted, since the analysis above assumes that the actions of foreign central banks are dominated by the Fed. This seems to have occurred in early 1981 as the German Bundesbank intervened substantially in support of the mark.

Thus,whether the recent close correspondence between U.S. interest rates and the dollar proves to be a summer romance or an enduring marriage depends critically on the future actions of the world's central banks, and in particular the Fed.

The internationalization of U.S. agriculture

Jack L. Hervey

Agricultural trade is a major component in the international trade account of the United States. The agricultural community can take pride in the important contribution of American farms and ranches toward feeding the peoples of the world. Assisted by its natural attributes of abundant and rich farmland and a generally temperate climate in combination with unsurpassed warehousing facilities, this country serves as the world's food storehouse. The United States is the primary supplier of numerous agricultural commodities to many countries, and it is also a major but marginal supplier to many others, including a number of the world's leading importers. Foreign buyers are heavily dependent on the reliability of supplies from the United States.

An equally important fact that often goes unrecognized is the profound dependence of American agriculture on its freedom of access to foreign markets. The internationalization of American agriculture has been a major contributor to the economic health of the industry. But, it has also opened the industry to the vagaries of international political gamesmanship and trade protectionist sentiment. The potential rewards of internationalization are considerable, but the associated risks of greater dependence on foreign markets have also increased.

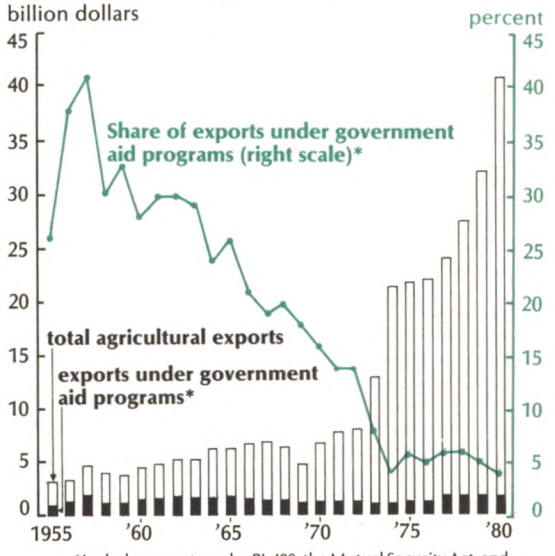
Agriculture and the U.S. trade balance

Trade in agricultural commodities has been one of the few continuously bright spots in the U.S. merchandise trade account during the past decade. The dollar value of domestically produced agricultural exports increased nearly sixfold from $7.7 billion in calendar 1971 to $41.2 billion in 1980 and is expected to total about $45 billion in 1981. Imports of agricultural commodities also grew substantially during the decade but at only one-half the export rate, increasing threefold from $5.8 billion to $17.4 billion in 1980. The agricultural trade surplus rose from $1.9 billion in 1971 to $23.9 billion in 1980. As a result, agricultural trade has contributed in an increasing and positive manner to the overall merchandise trade balance.

Agriculture has not always been a net positive contributor to the U.S. trade balance. Prior to World War II, agricultural imports typically surpassed the value of farm commodity exports.[1] During the war and the fol-

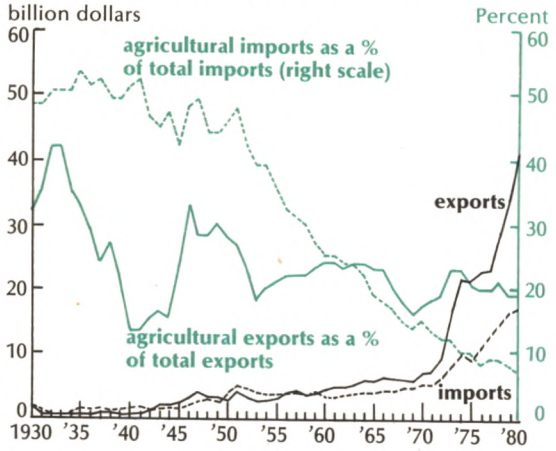
[1]Indeed, until fairly recently agricultural commodities dominated the value of total U.S. imports. In 1940 more than one-half of U.S. imports were agricultural. During the period 1945-54 agricultural imports accounted for an average of more than two-fifths of the value of all imports. By 1970 the share had dropped to 15 percent and in 1980 it was 7 percent.

Agricultural exports under government financed programs decline



*Includes exports under PL 480, the Mutual Security Act, and the Agency for International Development. Not included are shipments financed through Commodity Credit Corporation credits, Eximbank loans or guarantees, or the sale of government-owned inventories at less than domestic market prices.

Rapid growth in U.S. agricultural trade—a recent phenomenon



lowing reconstruction, to which U.S. agriculture was a significant contributor through government grants and concessional sales of farm commodities to foreigners, exports increased dramatically and exceeded imports through 1949. During the 1950s, however, the government's domestic agricultural policy supported the domestic prices of major agricultural commodities at levels well above market clearing prices on the world market. This contributed to a stagnation in shipments of U.S. farm commodities. Only an expansion in government-supported export programs such as export subsidies and sales to foreign countries on concessional terms—as, for example, under the terms of the Agricultural Trade Development and Assistance Act of 1954 (commonly known as PL 480)—maintained agricultural exports at the levels of the late 1940s.

Meanwhile, agricultural imports continued to rise with the result that deficits in agricultural trade were recorded in all but two years from 1950 through 1959. Agricultural trade grew moderately in the 1960s, with exports typically exceeding imports by $1 billion to $2 billion each year.

New markets in the 1970s

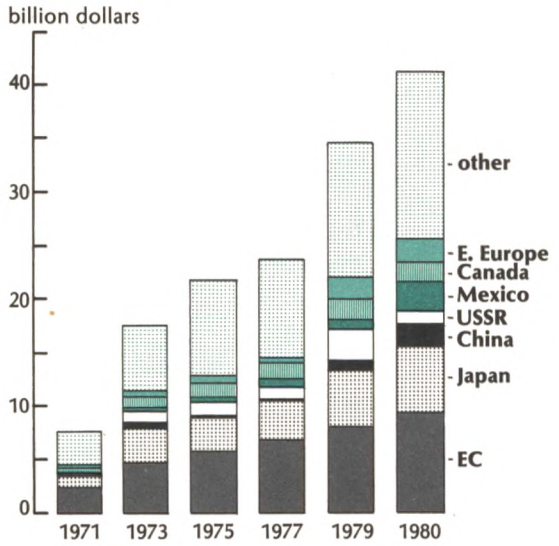
In the 1970s U.S. agricultural exports virtually exploded—in value as well as in quantity. At least three major factors contributed to this phenomenon: increasingly market-oriented prices for farm commodities, which made U.S. commodities more competitive in the world market; the opening of the Soviet and Chinese markets as political tensions eased during the decade; and rapidly increasing incomes abroad, which contributed to a shift in consumption patterns and a marked increase in the dietary demand for meats and high protein foods. The last factor in particular contributed to a large increase in foreign demand for U.S. feed grains, especially corn, and soybeans as foreigners increased their livestock production in order to improve the protein content of their diets.

Japan continued as the largest single-country foreign market for U.S. farm products in 1980, as it was throughout the 1970s and much of the 1960s. Its dominance as a U.S. export market is maintained on the strength of its demand for feed grains, soybeans, and wheat. In 1980 Japan took $2.1 billion of U.S. feed grains, more than double the value of such shipments to any other country. Japan imported $1.1 billion of U.S. soybeans and $596 million of wheat. In total, U.S. agricultural shipments to Japan were valued at $6.3 billion in 1980, 15 percent of all U.S. farm commodity exports.

The nine-member European Common Market (EC)[2] was the largest consolidated market for U.S. farm commodities—accounting for $9.3 billion, or 22 percent of the total. Four of the 12 leading foreign markets are contained within the borders of the EC—the Netherlands, West Germany, Italy, and the United Kingdom. These four countries accounted for 80 percent of the value of U.S. shipments to the EC. Agricultural shipments to the EC have been heavily in the animal feed category. Feed grains and oilseeds and oil-

[2]Greece became the tenth member on January 1, 1981. In 1980 the United States exported $307 million in agricultural products to Greece. Among EC members only Denmark and Ireland are smaller markets (Belgium and Luxembourg are considered as a single market). The other nine EC members are: Belgium, Denmark, France, West Germany, Ireland, Italy, Luxembourg, the Netherlands, and the United Kingdom.

U.S. agricultural exports by destination



NOTE: There is no figure for China for 1971.

seed products accounted for over 60 percent of U.S. agricultural exports to the EC in 1980.

Apart from the continuing importance of the EC, Japan, and Canada—Canada has traditionally been a large market for U.S.-produced animals, fruits, and vegetables—the relative importance of other foreign markets has varied substantially over the years. To some degree this reflects the fact that the United States is a marginal supplier of agricultural commodities on the world market. Its large productive capacity and typically substantial stocks, made possible by a large storage capacity for grains, have made it a ready source to fill gaps in supplies resulting from poor crops elsewhere.

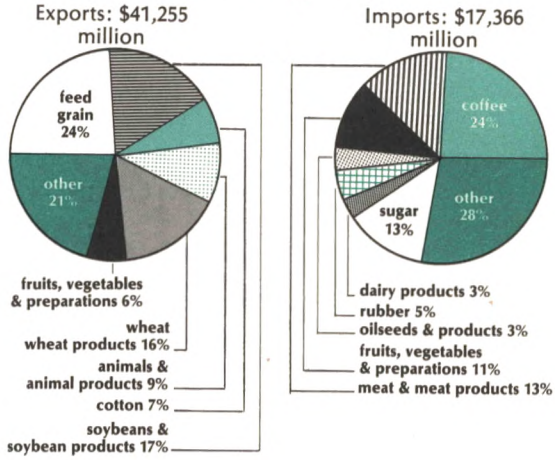
In 1971, for example, the USSR purchased only $45 million of U.S. farm commodities. But in 1973, following the Soviet crop disaster of 1972, U.S. agricultural exports to the USSR surged to $1 billion. By 1979 the figure had reached $4 billion, making the USSR the second largest single-country foreign market for U.S. farm commodities. The rapid development of the USSR as a market for U.S. grain was cut short following the Soviet invasion of Afghanistan in December 1979 and the subsequent partial embargo imposed by the United States on exports to the USSR. U.S. agricultural exports to the USSR declined to $1.1 billion in 1980. Nonetheless, the USSR still ranked as the tenth largest foreign market for U.S. agricultural products, ahead of such traditional major markets as the United Kingdom and Taiwan.

Mexico and China provide other examples of how the market has changed during the past decade. Agricultural exports to Mexico in 1971 were $128 million, less than 2 percent of the U.S. foreign market. By 1980 they had risen to $2.5 billion, or more than 6 percent of U.S. exports, making Mexico the third largest single-country market for U.S. farm products. China imported no U.S. agricultural commodities in 1971, but as political relations between the two countries improved in the mid-1970s so did the volume of trade.[3] By 1980 China was the fourth largest foreign market for U.S. agricultural products, accounting for $2.3 billion or 5.5 percent of the value of U.S. exports of agricultural products.

In an attempt to stabilize fluctuations in demand for U.S. products, the U.S. govern-

[3]Some observers have suggested that in fact the causal relationship may have been reversed; that is, China's need for U.S. grains initially helped contribute to a relaxation in political tensions. The same phenomenon may have contributed to the opening of the Soviet market.

U.S. agricultural trade by commodity, 1980



ment in recent years has entered into bilateral trade agreements with the countries that constitute the major nontraditional markets—the USSR, China, and Mexico. The intent of these agreements has been to guarantee simultaneously that U.S. exporters as marginal suppliers will be able to sell a specified minimum quantity of agricultural products in these foreign markets and that foreign buyers will be able to buy a specified minimum quantity from the United States.[4]

In some cases, these agreements may be used to set a ceiling on the volume of U.S. commodities that may be purchased by the foreign parties to the agreements in a given year. Such restrictions would be imposed to maintain "acceptable" supply/price relationships in the U.S. domestic market, as well as in the traditional foreign markets, in the event of a short U.S. crop or exceptional demand from the foreign markets.

Impact on U.S. agriculture

Agricultural exports have had a dramatic impact on U.S. agriculture. American farmers, especially those in the primary grain and soybean growing areas, have become progressively more dependent on foreign markets for their livelihood. In 1950, the value of total agricultural exports was about 10 percent of farmers' cash receipts from sales of farm commodities. During the next 20 years, exports as a proportion of cash receipts increased gradually, reaching 15 percent by 1971.

A marked acceleration in the dependence of U.S. farmers on foreign markets occurred during the 1970s, and by 1979 agricultural exports accounted for 24 percent of cash receipts from commodity marketings. In the agricultural heartland of the corn belt and lake states, the shift was even more dramatic, with exports increasing from 16 percent of cash receipts in 1971 to 30 percent in 1979.[5]

Today, though it is not widely recognized, American agriculture relies on the export market for its vitality to a greater degree than any other major industry group. As a result, the maintenance of a strong world economy, amicable and stable political relationships, and steadfast resistance to pressures for trade restrictions that could adversely influence its foreign markets, are of vital importance to the prosperity of the industry. As American agriculture has become an international industry, its vulnerability to the vagaries of international economic and political developments has increased correspondingly.

The internationalization of the industry has clearly affected the structure of the industry. During a time when technological developments have contributed to a sharp reduction in the number, and a significant increase in the average size of U.S. farms, the increased foreign demand for agricultural products may have helped keep afloat some farming operations that would otherwise have disappeared. It may also have kept other farms operating at a higher level of capacity utilization than would otherwise be the case. Concurrently, the increased production associated with supplying rapidly expanding foreign markets has heightened concern within the industry over the impact of recent changes in cultural practices on the industry's long-term productivity.

Biological scientists, in particular, have pointed out that these rapid increases in production have contributed to an intensification in cultural practices that has accelerated soil erosion and the depletion of this nonrenewable resource. Thus, while the internationalization of American agriculture has contributed greatly to the industry's growth and short-run prosperity, it has not occurred without cost. The magnitude of that cost has yet to be determined.

[4]In the U.S.-USSR grain agreement, for example, the USSR agreed to purchase 6 million metric tons of grain annually (roughly equal proportions of wheat and corn) and the United States agreed to supply up to 8 million tons annually without special authorization. Purchases in excess of 8 million tons required U.S. government approval. The original agreement with the USSR went into effect in 1976 and expired this year. With the lifting of the embargo in late April, discussions between representatives of the U.S. and USSR began in August and concluded with an agreement to extend the provisions of the original accord for one year—through September 30, 1982.

[5]These eight states are: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin.

A new role for federal crop insurance

Jeffrey L. Miller

The federal crop insurance program has been revised under provisions of the Federal Crop Insurance Act that was signed in September 1980. The revisions represent an important change in policy and are intended to establish the Federal Crop Insurance Corporation (FCIC) as the primary institution offering farmers protection against low crop yields.

The partially subsidized FCIC program is designed to replace the fully subsidized disaster payment programs that have been the federal government's predominate form of disaster protection for producers of grains and cottons since the mid-1970s. The new legislation directs the FCIC to extend the crop insurance coverage to all agricultural counties and to consider underwriting insurance on additional agricultural commodities.

If the FCIC program expands as expected, agricultural lending may be affected in the process. Lenders may require farmers to purchase the insurance in order to reduce the risks associated with crop production and to make sure that farmers have funds available to repay operating loans in the event of low yields.

History of crop insurance programs

Federal crop insurance started in 1938.[1] The first act created the FCIC as a government-owned agency within the U.S. Department of Agriculture (USDA) and authorized insurance programs for unavoidable crop losses due to adverse weather, insect infestations, plant diseases, wildlife, and other risks. Losses due to neglect, poor farming practices, theft, or low prices were not included. Operating and administrative costs were covered by government appropriations, while premiums were designed to cover claims for losses and to build reserves. Payments for claims were limited to a portion of the value of the crop loss rather than the full value.

The first program was limited to wheat, although cotton was added after the second year. Heavy losses to wheat crops resulting in large indemnity (claim) payments in the first four years of the program prompted the Congress to suspend the program in 1943. New legislation in 1944 temporarily revived the insurance program for several crops, but the program was scaled back to an experimental basis following large cotton losses in 1945 and 1946.

Percent of FCIC indemnities paid by type of loss, 1939 to 1978

Drought	41.5
Freeze	13.9
Flood	2.2
Wind	6.7
Disease	2.8
Hail	10.8
Insects	4.6
Excess moisture	15.9
Other	1.6
Total	100.0

Federal crop insurance was restored in 1948 and since that time has been gradually expanded. Subsequent legislative changes have increased the number of insurable commodities from seven in 1948 to 28. The number of counties eligible for some coverage has expanded from about 400 in 1948 to 1,700.[2]

[1]Prior to the legislation most of the available crop insurance covered only fire and hail damage. Private companies, cooperatives, and even some state governments provided the insurance. Multiple peril or all-risk crop insurance was for the most part not available from private insurance firms.

[2]The number of different crops that are insurable in individual counties varies. In 1980 there were 4,629 crop programs, covering an average of about three different crops per county in over 1,600 counties.

Experience with crop insurance

On balance, FCIC indemnity payments have exceeded premiums. For the entire period 1948-80, indemnities have been about $1.6 billion, or 9 percent more than premiums. Ten of the 28 crops—including soybeans—had favorable overall indemnity-to-premium ratios during the period, while for 18 other crops, payments exceeded premiums. There has been a persistent tendency for indemnities to exceed premiums on cotton, citrus, potatoes, and forage seeding. In 1980—a year of large crop losses due to widespread drought—the indemnity-to-premium ratio was 2.2, the highest since 1945.

Despite the expanding coverage provided by the FCIC, farmer participation in the program has been low. The proportion of *eligible* acreage actually insured by the FCIC has averaged about 9 percent since 1948. The most acreage in any one year, 26.6 million acres, was insured in 1980. However, this represented only 12 percent of the 221.8 million insurable acres and only 7 percent of all the cropland in the United States.

Contributing to farmers' aversion to make greater use of the insurance have been the limited scope of the program, the low crop yield protection level, and, in recent years, the availability of competing disaster protection plans. Before 1980 federal crop insurance was offered on one or more of 27 different insurable crops in 1,526 counties. The remaining half of the agricultural counties in the United States and most of over 300 crops produced in the country were ineligible for FCIC insurance. While past legislation allowed expansion, limits on appropriations kept the expansion below the authorization. In addition, only one yield protection level, typically 60 percent, was allowed for a given crop. For many farmers this coverage was inadequate to cover the out-of-pocket expenses of producing a crop. The premiums, based on actuarial needs to meet losses and build reserves, were considered too high for the level of protection offered. During the last seven years, other disaster payment programs have been made available to producers of major crops.

The disaster payment provisions in the government's programs for wheat, feed grains, rice, and cotton have provided the bulk of the protection against low crop yields since 1973. These provisions partially compensate farmers who suffer losses due to inability to plant, or subnormal yields resulting from flood, drought, or natural disaster. To be eligible for payments, farmers have to set aside land—if such requirements are imposed—and operate within their normal crop acreage base. The payments are made to participants whose yields drop below 60 percent of the participant's average yield. The payment rate per bushel is tied to a "target price" determined by the Secretary of Agriculture. Total disaster payments from federal monies for the years 1974-80 were over $3.4 billion. About one-fourth of the total payments made under the program, over $900 million, was distributed in 1980.

Another program that has played a substantial role in providing assistance to farmers who suffer losses is the Emergency (Disaster) Loan Program of the Farmers Home Administration. Under this program loans are made in counties designated as disaster counties to farmers who suffer a loss of 20 percent or more in a major farm commodity enterprise. (In late spring the requirements were changed such that a loss of 30 percent or more in certain specified enterprise categories is required for eligibility.) Interest rates as low as 5 percent are available to borrowers who do not qualify for credit from commercial lenders. Such disaster declarations are often widespread. Over 2,300 counties were eligible in 1980.

The new FCIC program

Last year's legislation is designed to expand the coverage of the federal crop insurance program to all 2,740 agricultural counties. The number of crops eligible for coverage will also be increased as sufficient actuarial data—the history of losses in an area—are established. It was the intent of the legislation

that the FCIC's program would become the primary form of protection against production risks for farmers. Unless extended in some form by the Congress, the disaster payments provisions for grains and cotton will expire this year. The FmHA emergency loan program will remain in operation unless altered by budgetary cutbacks or changes made in the major farm legislation this year.

The new insurance act incorporates several major provisions. Participants can elect one of three levels of yield protection and one of three levels of price protection. The options on yield protection are 50, 65, or 75 percent of the historical average yield in the participant's county or risk area within a county. The options on price protection are determined annually by the FCIC and apply to all areas. The highest price option is at least 90 percent of the annual price projected by the FCIC, based on trends, forward contracts, and judgmental factors. For 1981, price options are $1.70, $2.00, and $2.70 for corn and $4.50, $6.00, and $7.00 for soybeans. Options for the

Ratio of indemnities to premiums by crop, 1948-80

Program	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
Wheat	.58	1.43	.52	1.06	.85	1.25	1.42	1.26	1.09	.60	.16	.68	.23	1.09	.38
Cotton	.43	1.97	2.81	.82	.44	1.05	.56	.84	.67	.54	.25	.45	.52	1.38	1.24
Combined crop	.06	.16	.94	1.65	2.33	.91	1.50	1.42	1.28	.83	.36	1.70	.27	1.23	.76
Tobacco	.43	.66	.61	.49	.79	1.90	.89	.40	.28	.34	.19	.38	.35	.29	.79
Corn	.17	.16	1.26	2.38	.25	.17	.56	1.47	3.35	.46	.56	.87	1.45	.23	1.52
Flax	.51	.62	.42	.49	.79	.95	.77	.77	.54	2.46	.45	1.64	.47	1.27	.65
Bean	.29	.64	1.84	3.14	.55	.62	1.60	.66	.96	1.03	.32	.91	.59	.54	2.03
Citrus**				0	.04	0	0	.03	.22	7.25	.15	.24	2.11	2.36	9.25
Soybean								.73	.74	.65	.36	.44	.56	.54	.67
Barley									.39	.35	.39	1.08	.69	1.53	.81
Peach										.50	.77	1.13	.76	.63	1.81
Grain sorghum												.27	.28	.70	.39
Oat												.99	.65	1.26	.47
Rice													.58	1.03	.64
Raisin														.01	0
Pea															3.08
Peanut															.35
Apple															
Tomato															
Sugar beet															
Grape															
Sugarcane															
Sunflower															
Sweet corn															
Forage seeding															
Potato															2.17
Forage															
Rye															
All Programs*	.53	1.31	.91	1.12	.97	1.15	1.24	1.14	1.26	.69	.26	.77	.58	.89	1.10

*Includes cherry and safflower programs discontinued after the 1966 crop year and tung nuts discontinued after the 1970 crop year.

The 1980 crop year ratios are based on preliminary estimates.

SOURCE: Federal Crop Insurance Corporation.

1982 wheat crop are $2.50, $3.50, and $4.50.

The premium paid by a participant will depend on the combination of yield and price protection (coverage) that is selected. The premium schedule is based on the loss experience in the participant's county or risk area. A premium subsidy of 30 percent is available for those who select the 50 percent or 65 percent yield coverage. The subsidy for those selecting the 75 percent yield coverage has a maximum limit equal to 30 percent of the premium applicable to the 65 percent yield coverage. Participants who purchase hail and fire coverage from a private insurance firm will lower their FCIC premium costs by up to 30 percent. The act also permits a state government or an agency of the state to pay other premium subsidies so as to reduce further the farmer's share.

The FCIC, to the maximum extent feasible, is to use the delivery system of the private insurance industry to market and service federal crop insurance. Farmers may apply for policies at designated local insurance agen-

1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1948-80
.95	.57	1.24	.54	1.14	1.01	.74	.46	.42	.42	.83	.97	.51	.94	1.47	.48	.98	2.70	1.04
.70	.46	.84	2.29	3.85	1.92	2.61	1.33	1.67	.97	.46	2.24	3.22	3.57	.47	1.13	1.48	1.62	1.55
.45	.45	.07	.41	2.12	.10	.06	.21	.14	.29	1.02	1.06	.61	.46	1.06	.08	.07	5.81	1.16
.62	.31	.53	.59	.38	.54	1.06	.58	.39	.36	.67	.29	1.06	.91	2.98	.42	1.11	2.53	1.04
.41	1.67	2.04	.45	.94	.66	.57	1.17	.37	.25	.25	2.30	1.16	2.40	1.86	.20	.15	1.58	1.12
.79	1.41	.40	.96	.79	.36	.27	.93	.69	.70	1.24	1.94	.98	2.53	1.44	.65	.53	1.81	.89
.61	1.58	2.29	1.03	.64	1.35	.82	1.18	.67	.52	.91	.13	.82	.68	1.01	.90	.34	1.02	.96
.03	.45	1.11	.29	2.75	2.21	1.75	3.11	.63	1.23	.44	.42	.37	2.66	.28	1.01	.50	1.18	1.35
.98	1.02	.95	.58	1.27	.78	.89	.59	.72	.79	.31	1.01	.39	1.11	.39	.35	.38	1.78	.84
1.05	.53	.24	.42	.62	.43	.31	.66	.30	.61	.86	1.53	1.07	1.31	.99	.40	.56	2.29	.93
1.03	3.50	.53	.95	2.29	.24	.41	1.19	1.77	2.18	2.41	1.14	1.42	.46	.50	2.17	.15	.61	1.25
.75	1.03	.50	.42	.76	1.01	.41	.96	.58	.87	.23	1.63	.52	.91	.47	1.47	.62	2.80	1.04
.60	.69	.22	.60	.48	.39	.43	.47	.25	1.23	1.03	1.05	.53	2.99	.56	.53	.60	2.48	.85
0	.68	.43	.34	.31	.77	.44	.07	.51	.57	.63	.41	.23	.54	.72	.76	1.58	3.36	1.22
3.64	.02	.07	.07	.06	.03	.30	0	0	.01	.02	0	.20	11.66	.02	12.13	0	0	1.03
.53	2.64	.87	2.69	.76	2.77	.72	.98	.59	.52	1.54	.78	.83	.80	2.93	.84	.63	.58	1.28
.77	1.31	.26	.25	.55	.53	.63	.22	2.16	.53	.21	.32	.32	.49	.57	.28	.67	8.91	1.42
.35	.92	.37	1.91	.91	3.33	.24	1.65	1.06	3.25	1.31	1.48	.18	1.38	1.93	1.07	.80	.67	1.25
.41	.25	.27	1.81	.64	.97	1.79	.30	.40	.84	.97	2.38	1.93	.19	.79	.29	1.44	.29	.76
		.29	.58	.60	.64	1.82	1.32	.56	1.01	.77	1.13	1.90	.59	.33	.20	.39	.72	.78
				1.02	1.25	2.59	.77	0	4.10	1.55	.11	.10	.25	3.85	.20	.22	.27	1.01
				.07	.20	.08	.22	.89	.94	2.79	.50	.46	.64	.84	1.57	.70	1.49	.88
													.35	.12	.12	.43	1.51	.87
															.57	.54	.62	.57
															2.39	4.57	5.87	4.60
2.21	3.98	1.08	2.27	1.05	1.38	1.54									0	.14	0	2.06
																.68	3.41	1.99
																	1.90	1.90
.77	.90	1.13	.68	1.27	1.05	1.09	.94	.60	.60	.60	1.17	.86	1.57	1.46	.50	.65	2.20	1.09

Federal crop insurance availability on 1981 crops in District states

	Number of county programs*				
	IL	IN	IO	MI	WI
Crop					
Corn	101	87	99	38	57
Grain sorghum	5				
Oats	6		97	13	56
Soybeans	101	87	99	25	18
Wheat	72	82	8	30	1
Tobacco		11			10
Barley				1	
Beans				17	
Sugar beets				6	
Sweet corn					20
Peas					25
Forage production					1
Forage seeding					1

*Illinois has 102 counties; Indiana, 92; Iowa, 99; Michigan, 83; and Wisconsin, 72.

cies, FCIC offices, or other government agencies. Private insurance companies may even provide an all-risk crop insurance plan to farmers and, if the plan meets certain standards, reinsure it with the FCIC.

In the event premiums and reserves available to the FCIC are inadequate to meet indemnities, emergency funding may be sought. Commodity Credit Corporation funds may be used for up to one year to supplement payments to farmers, or monies may be borrowed, if authorized, from the U.S. Treasury at prevailing interest rates.

These provisions of the new act differ somewhat from earlier acts and may overcome some of the difficulties experienced historically with crop insurance. In order to make the insurance coverage more attractive, protection levels in excess of the 50 to 68 percent level previously available on a crop are now offered for all crops. Also, an individual yield coverage plan, whereby individual farm yields are used in place of countywide or risk area yields, is available to producers of the six commodity program crops and soybeans if the participants can prove their yields are higher than the established yields for the area. In addition, the premium is now subsidized to reduce the cost of insurance to farmers and to encourage greater participation. This also functions to allow the federal government a mechanism for continued subsidization of disaster payments similar to that which has prevailed under the commodity programs.

The provision to market the insurance through private insurance firms is a concession to the insurance industry because of its expressed concern over the role of government in the insurance business. As a result, farmers are offered a much larger service network than was possible under the FCIC organization. The FCIC also gains a more substantial sales force for promoting the program. The provision for emergency funding provides a safeguard against deficits that is a prerequisite for duplication of the widespread coverage of land area that was pro-

How federal crop insurance works

A farmer wants to insure 100 acres of soybeans in Farmer County, USA. The FCIC has determined the average county soybean yield to be 40 bushels per acre. The farmer can choose one of three yield coverages:

50 percent or 20 bushels per acre;
65 percent or 26 bushels per acre;
75 percent or 30 bushels per acre.

He can also choose one of the three price level coverages offered by the FCIC: $4.50, $6.00, or $7.00 per bushel.

If he selects the 65 percent yield coverage and the $7.00 price protection, the premium according to a schedule of rates would amount to $4.70 per acre. However, since the FCIC will subsidize 30 percent, his net premium is $3.30 per acre for multiple risk crop insurance.

If drought conditions reduce his yield to 10 bushels per acre on the 100 acres, he would be eligible for an $11,200 payment (16 bushels loss per acre x $7.00 x 100 acres. His cost for this protection was $330 ($3.30 x 100 acres).

vided under the commodity program. In 1980 the six crops that were included in the commodity programs accounted for about half of the cropland harvested.

The future of crop insurance programs

The program may be broadened in the future as a result of research and pilot programs permitted by the act. Insurance on rangeland, livestock, bees, nuts, vegetables, aquaculture species, forest products, and other commodities could be added.

Expansion into the new commodities may come about slowly, though, since about four years are needed to study and test a program in an area. It is also uncertain whether or not insurance would be made available on a commodity that is not a major source of agricultural income in an area. For now, priority will be given first to duplicating coverage on the six major crops—corn, wheat, barley, rice, sorghum, and cotton—that were part of the commodity programs and then to other principal crops—especially soybeans.

Implications of the new program

Participation by farmers may not increase significantly until 1982 when the FCIC program is scheduled to take over as the primary form of protection against low crop yields. Preliminary estimates indicate that sales of crop insurance in 1981 have doubled from 1980's level. Whether the program ultimately assumes its anticipated new role, however, will not be resolved until the Congress completes action on major farm legislation this year. Other existing forms of crop disaster protection may be continued and new forms may be enacted. If that occurs, then federal crop insurance may retain the minor role in protecting farmers against low crop yields that it has played in the past. If other programs are dropped, then participation in the federal crop insurance program may climb as farmers choose, in response to the more liberal provisions of the new program, to accept a small additional expense, the insurance premium, in place of the possibility of large crop losses. As a result, the government's cost of providing disaster relief to farmers suffering low crop yields could diminish. Outlays by the government will be necessary, but the amount could decline substantially below the levels necessary to run fully subsidized, duplicate programs.

Higher farmer participation could benefit agricultural lenders, since farmers have the option of assigning FCIC claim payments to lenders. This would reduce the risks of lending, since repayment is protected by the assurance that cash inflows continue when there is a major loss. Lenders may serve as catalysts to the promotion of federal crop insurance as they seek to protect the funds they lend to a farming industry plagued by wide variability in production.

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