Is Exchange Risk Hedgable?

It is now about 15 years since the world abandoned the Bretton Woods system of fixed exchange rates. The debate over the advantages of fixed vs. flexible rates will doubtless continue for many years as exchange rates continue to be highly volatile (see chart). Among the issues in this debate are the extent to which different exchange rate regimes promote or hinder international trade and investment and the impact of different regimes on the stability of prices, employment, investment, and interest rates.

Perhaps the major criticism of flexible exchange rates has been that they impose exchange risk on economic agents, especially importers, exporters, and international investors. Exchange risk refers to loss associated with unexpected movements in international exchange rates. Opponents of flexible rates claim that exchange rate fluctuations comprise a major deterrent to international trade and investment, and hence impose significant costs on the economy. Presumably, agents would refrain from undertaking socially beneficial trade and investment projects because of the fear that they would suffer losses when exchange rates move.

Proponents of flexible rates have tended to minimize the importance of exchange risk as a barrier to international trade and investment. In his classic defense of flexible rates, Milton Friedman states: "Under flexible exchange rates, traders can almost always protect themselves against changes in the (exchange) rate by hedging in a futures market . . . Any uncertainty about returns will then be borne by speculators. The most that can be said . . . is that flexible exchange rates impose a cost of hedging on traders."

Attempts to settle this debate empirically have produced disappointing results. This *Letter* considers the circumstances under which exchange risk is "hedgable", that is, when it can be completely eliminated or neutralized.

The issue of "hedgability" of exchange risk has important policy and theoretical implications. If all exchange risks were hedgable, there would be no harm to the economy from volatility and uncertainty in foreign exchange markets. Exchange risk, therefore, would not give governments cause to attempt to stabilize exchange rates, and would give even less cause for pegging rates. Moreover, exchange rate volatility would not constitute a barrier to international trade and investment.

At the theoretical level the problem is often just assumed away, i.e., risks are assumed to be covered in all cases by a hedge created along the lines to be described. However, as will also be discussed, forward coverage eliminates exchange risk completely only in very special circumstances. In most cases, it reduces exchange risk without eliminating it. Whenever that is the case, exchange rate volatility remains "harmful" even when hedging tools are available and widely used by traders and investors.

How does a hedge work?
How does hedging of exchange risk operate? Suppose a U.S. exporter expects a payment of 1 million British pounds in 180 days. At that time, the exporter may convert the pounds into dollars at the then-prevailing spot exchange rate. The exporter faces some uncertainty, however, in that the rate, and hence the dollar value of the payment, will not be known for 180 days.

To eliminate uncertainty regarding the dollar value of the future sterling payment, the exporter may decide to "sell the British pounds forward" by contracting with most commercial banks to convert them into dollars at the forward exchange rate quoted today. Such a forward contract would obligate the exporter and the bank to swap dollars for pounds on a specific date (180 days hence in our example) at a specified rate of conversion, known as the forward exchange rate. In general, no funds are exchanged until the day the contract expires.

A futures contract purchased through a futures exchange would be an alternative means of hedging exchange rate risk. Foreign currency futures contracts are somewhat similar to forward contracts, but they tend to be more uniform, with a limited number of expiration dates and contract size and with margin requirements. (Forward contracts are often contracts "custom-built" according to customer needs and specifications.) In either case, the forward (or future) exchange rate can, in general, be either higher or lower than the prevailing spot exchange rate, but it is known and certain in all cases.

In reality, only a small proportion of international trade is covered by forward or futures hedging. This may be because traders can engage in an alternative form of hedging that is equivalent to forward coverage but could involve lower transaction costs in some cases. The exporter can create an equivalent hedge by borrowing funds in sterling for 180 days against the funds receivable, and investing the borrowed funds in a dollar certificate of deposit maturing in 180 days. In effect, the exporter locks in the dollar value of the sterling receivables. Similar hedging tools would be available to importers who must make payment in foreign currency, and for some international investors who could use forward contracts or their equivalents to hedge against exchange rate risks.

Hedging uncertain amounts
The previous example assumes that the agent who wishes to hedge exchange rate risk knows exactly the quantity of foreign exchange to be received (or paid) at a specified future date and may then hedge it. But what if the agent does not? The "total" amount of uncertainty to which the exporter is exposed is, in a sense, a complex sum of the two individual uncertainties — exchange rate volatility and quantity risk.

An analogy may help illustrate this point. A hearty employee walking to work on a midwestern winter's day faces two meteorological risks that contribute to total "risk": temperature variations and wind variations. While the walker could "hedge" the temperature variability by sticking to sunny exposed streets, those streets may not necessarily make the best route,

especially if they involve walking through some wind corridors. Even when he chooses the best route for walking, any reduction in the general variability of temperature would make him better off, other things remaining equal.

In the same sense, when price and quantity risks co-exist, exchange risk is not fully hedgable. It can be shown that even when the quantity of foreign exchange to be hedged is independent of exchange risk and the "best" hedging strategy (the one that minimizes the risk to the agent) is being used, there will always remain a residual risk. This residual depends positively on the variances or degree of uncertainty of both the exchange rate and the quantity to be hedged. That is, the residual risk is higher, the greater is exchange rate volatility. The more volatile is the exchange rate, the riskier would be the agent's position, and the less the incentive to trade.
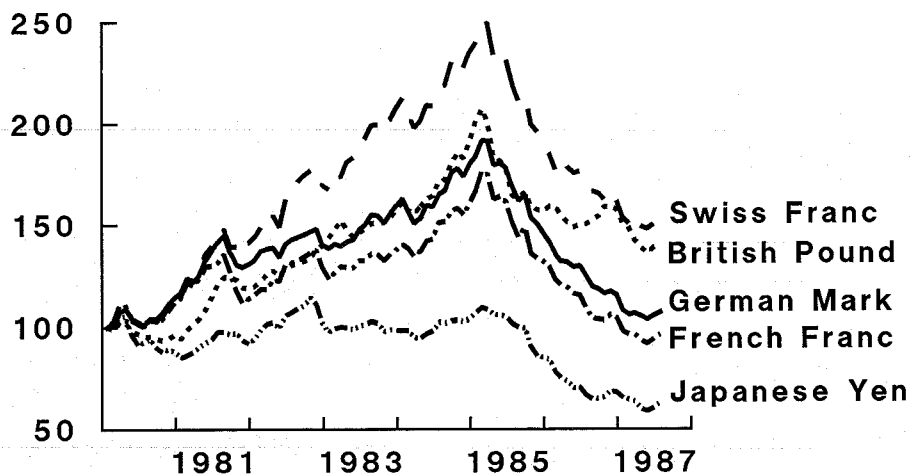
Any stabilization of exchange rates would then reduce risk, benefit the agent, and expand trade. If the quantity to be hedged were correlated with exchange risk, this correlation would also enter into the calculation, but the basic conclusion would still hold. The residual risk would be, in a sense, a hybrid function of each source of uncertainty, and it would depend in particular on exchange risk. That being the case, exchange rate volatility would impose a cost on and therefore remain a problem for the trader. Its reduction therefore would benefit the trader.

Hedging and inflation
Now suppose instead that the quantity of foreign currency to be hedged were known and certain, but that there were uncertainty in the United States with respect to inflation rates in the near future. An exporter who was due to receive 1 million pounds in 180 days would convert them through forward coverage into dollars as described above. He would then know with certainty what the future *nominal* dollar value of that payment would be. But he would not know its *real* value (in terms of U.S. purchasing power), which remains *uncertain* even with forward coverage. Of course, inflation uncertainty accompanies domestic trade as well. Nevertheless, the total uncertainty of the foreign currency position would depend on both sources of risk — inflation and exchange rate volatility — and their interrelationship.

Volatile Exchange Rates

Per U.S. dollar*

250
200
150
100
50

Swiss Franc
British Pound
German Mark
French Franc
Japanese Yen

1981   1983   1985   1987

*Index Jan 1980 = 100

Not only would the payment remain "risky" in real terms even when a risk-minimizing hedge is used, but it can be shown that the riskiness would increase with *both* exchange rate volatility and inflation uncertainty. Once again the stabilization of exchange rates would reduce risk even for traders and investors who use forward markets to hedge. Hedging would completely eliminate exchange risk only if inflation risk could be totally eliminated. (This could only be done through trade in financial assets indexed to the consumer price index.)

Conclusion

In general, exchange risk is completely "hedgable" only when there exists no other source of risk or uncertainty for agents engaged in foreign exchange transactions. When some other source of risk exists, "optimal hedging" may reduce exchange risk but will not in general eliminate it. Residual risk of hedged positions held by traders and investors in this circumstance will be a positive function of exchange rate volatility.

That is, it would increase with increases in exchange rate volatility.

This is true, as we have seen, whether the other source of risk is uncertainty over inflation or the quantity of foreign currency involved. It would also hold if the timing of the receipt of a payment in foreign currency were uncertain (as it would be for some international investments), if a forward exchange rate were unavailable for the date of payment (e.g., because the date is far off), and if there were default risk associated with the foreign exchange receivable.

Since the residual risk for even optimally hedged positions depends on exchange rate volatility, the debate over appropriate exchange rate regimes cannot ignore the impact of exchange rate volatility on risk. This volatility imposes costs and therefore deters some trade and investment.

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BANKING DATA—TWELFTH FEDERAL RESERVE DISTRICT
(Dollar amounts in millions)

Selected Assets and Liabilities Large Commercial Banks	Amount Outstanding 10/28/87	Change from 10/21/87	Change from 10/29/86 Dollar	Percent[7]
Loans, Leases and Investments[1] [2]	208,853	1,169	5,522	2.7
Loans and Leases[1] [6]	183,986	496	1,417	0.7
Commercial and Industrial	51,102	5	1,076	2.1
Real estate	71,904	112	5,172	7.7
Loans to Individuals	36,986	136	− 4,468	− 10.7
Leases	5,416	− 7	− 178	− 3.1
U.S. Treasury and Agency Securities[2]	17,642	644	4,741	36.7
Other Securities[2]	7,225	29	− 637	− 8.1
Total Deposits	205,574	− 839	1,337	0.6
Demand Deposits	51,459	− 410	568	1.1
Demand Deposits Adjusted[3]	35,596	− 1,012	− 11,255	− 24.0
Other Transaction Balances[4]	19,657	− 280	2,125	12.1
Total Non-Transaction Balances[6]	134,458	− 150	− 1,355	− 0.9
Money Market Deposit Accounts—Total	43,990	− 438	− 2,369	− 5.1
Time Deposits in Amounts of $100,000 or more	31,573	250	− 2,291	− 6.7
Other Liabilities for Borrowed Money[5]	26,408	2,707	− 969	− 3.5

Two Week Averages of Daily Figures	Period ended 10/19/87	Period ended 10/5/87	
Reserve Position, All Reporting Banks			
Excess Reserves (+)/Deficiency (−)	61	0	
Borrowings	22	158	
Net free reserves (+)/Net borrowed(−)	39	− 157	

[1] Includes loss reserves, unearned income, excludes interbank loans
[2] Excludes trading account securities
[3] Excludes U.S. government and depository institution deposits and cash items
[4] ATS, NOW, Super NOW and savings accounts with telephone transfers
[5] Includes borrowing via FRB, TT&L notes, Fed Funds, RPs and other sources
[6] Includes items not shown separately
[7] Annualized percent change