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SIX POSSIBLE MEANINGS OF
"OVERVALUATION": THE 1981-85 DOLLAR

JEFFREY A. FRANKEL



INTERNATIONAL FINANCE SECTION

DEPARTMENT OF ECONOMICS

PRINCETON UNIVERSITY

Princeton, New Jersey

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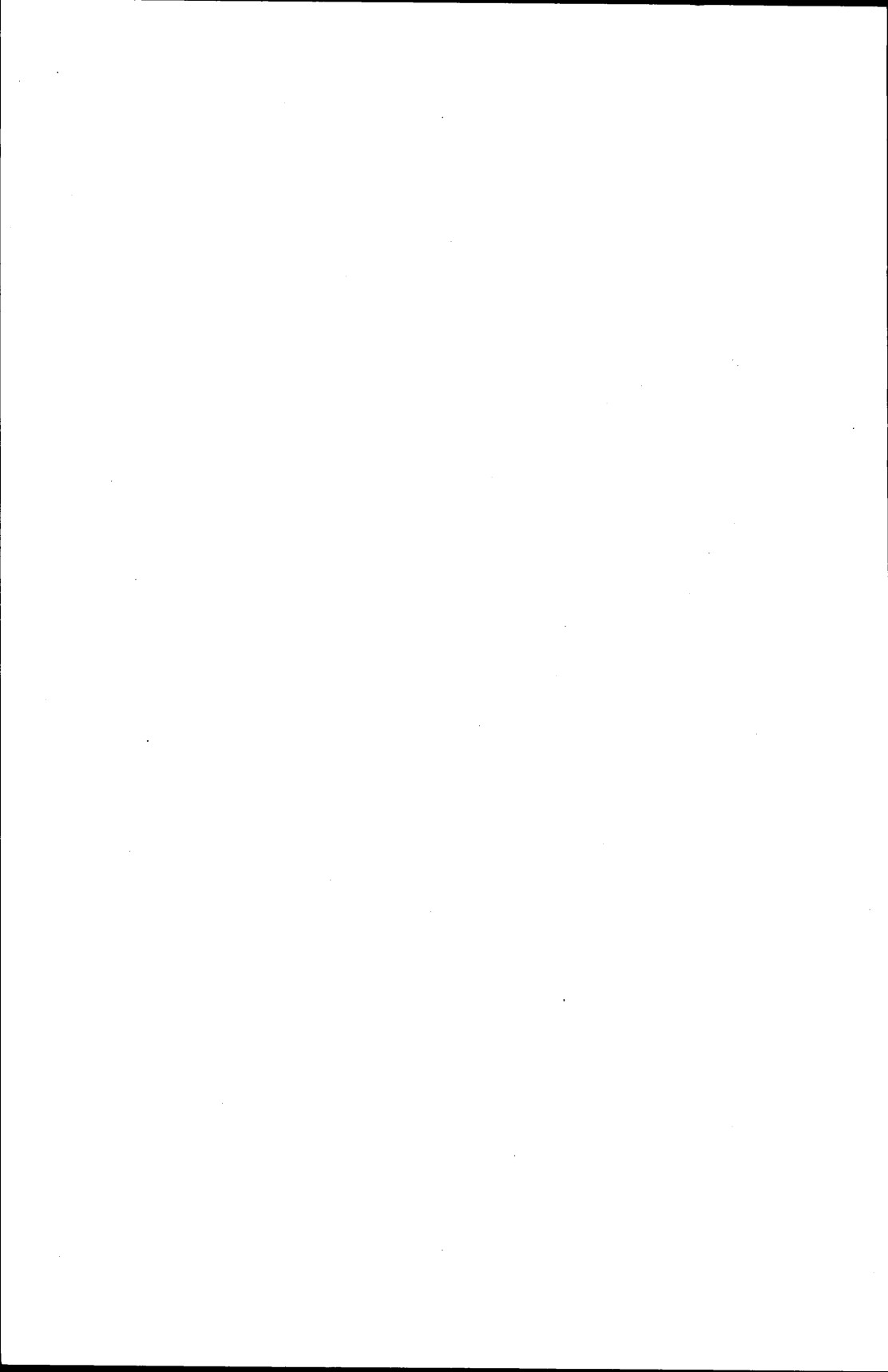
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Six Possible Meanings of "Overvaluation": The 1981-85 Dollar

1 Introduction

There is near-unanimity that for several years the dollar has been greatly overvalued. As early as 1982, Bergsten (p. 1) warned:

The dollar is overvalued by at least 20 percent. . . . These imbalances are as great as those in the final, breakdown stage of the Bretton Woods system of fixed exchange rates. They add significantly to national growth problems, both in countries with overvalued currencies (which suffer competitive losses) and countries with undervalued currencies (which are driven to adopt restrictive monetary policies).

According to more recent calculations of Williamson (1985, pp. 85-86),

The peak overvaluation of the dollar in late February and early March 1985 was more than 40 percent, . . . about double the estimated overvaluation of the dollar which brought the collapse of the Bretton Woods system of fixed parities in the early 1970s.

What does this word "overvalued" mean? Economists have an instinctive aversion to it. But it is clear that the value of the dollar during the first half of the 1980s was indeed very high, not only relative to its past history but relative to such long-term fundamentals as relative price levels or money supplies and income levels. This fact is documented in section 2 below.

This essay proposes six possible and very distinct definitions of the words "overvaluation" and "undervaluation," or the equivalently ambiguous term "disequilibrium," and uses them as an organizing principle to discuss recent theoretical and empirical research in the economics of exchange rates.

First, these words could refer to *nonclearing of financial markets*, where, because of barriers to capital movements, the exchange rate is at a level at which the supply of foreign exchange does not equal the demand.

Second, "overvaluation" could mean that a currency's private supply exceeds its private demand and that *foreign-exchange intervention* by one or more central banks is supporting the value of the currency at a level higher than it would be in a completely free market. These two definitions are discussed in section 2.

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Third, "overvaluation" could describe a currency with a value that is higher than dictated by long-term fundamentals because it is determined by short-term macroeconomic fundamentals such as the real interest rate. This is the phenomenon of *overshooting* discussed in section 3.

Fourth, "overvaluation" could mean that speculators can expect to make money by selling the currency forward. This is the possibility of *irrational expectations* discussed in section 4.

Fifth, "overvaluation" could mean that, even if expectations are rational, the exchange rate nevertheless diverges from the equilibrium determined by fundamentals, short-run as well as long-run. This is the possibility of *speculative bubbles* discussed in section 5.

Sixth, "overvaluation" could pertain to the real effects of the exchange rate rather than to its determinants. Under this interpretation, the loss in competitiveness by domestic industries that export or that compete with imports is undesirable. Or the reverse effects in foreign countries are undesirable for them. The possibility of overvaluation in a *normative* sense is addressed in section 6.

A distinction that proves to be necessary throughout is between long-term swings and short-term volatility in exchange rates. Both have been large. To anticipate the conclusions in the essay regarding long-term swings, the 1980-85 real appreciation of the dollar is attributed primarily to an increase in the U.S. real interest rate relative to foreign real interest rates, as in the overshooting model of exchange rates. The increase in the U.S. real interest rate is in turn attributed to two causes, corresponding to the two halves of the period: first, the sharp tightening of U.S. monetary policy that was first signaled in October 1979 and that ended in mid-1982, and, second, the emergence of record federal budget deficits that were a source of growing concern from 1982 to 1985. Two other possibilities, irrational expectations and rational speculative bubbles, are rejected as major explanations for the dollar overvaluation. This still leaves to each a possible role in causing short-term exchange-rate volatility.

As to welfare effects, discussed in section 6, high short-term exchange-rate volatility which generates uncertainty must have a resource cost, but there is no evidence that it is large. The welfare effects of longer-term swings are more controversial. An argument is presented that by reallocating output among sectors, each of which is characterized by its own concave supply curve, a large real appreciation can affect the terms of the aggregate tradeoff between output and inflation. When a country adopts contractionary monetary policies to fight inflation, as the United States did in 1980-82, the tendency of the currency to appreciate has a favorable effect on the tradeoff. It serves to balance the contraction between the sectors producing traded and nontraded goods, mitigating the loss in total output for any given level of in-

flation. But when a real appreciation is the result of an expansionary fiscal policy, as has been the case for the United States in recent years, the resulting squeeze on the traded-goods sector produces a "lopsided recovery," with a lower level of total output for any given level of inflation.

2 Long-Term Monetary Fundamentals

The monetarist model is a useful starting point for considering the determination of exchange rates on the basis of fundamental variables (see, e.g., Frenkel, 1976). One component of this model views the bonds of different countries as essentially perfect substitutes in investors' portfolios and views barriers to instantaneous adjustment of portfolios as low. As a consequence, uncovered interest-rate parity holds: international arbitrage equates the nominal-interest-rate differential to the expected rate of depreciation. The second component of the model views the goods of different countries as essentially perfect substitutes and views barriers to instantaneous adjustment in goods markets as low. As a consequence, purchasing-power parity holds: the exchange rate is given by the ratio of domestic to foreign price levels. The price levels are in turn given by nominal money supplies relative to real money demands, the latter usually modeled as functions of real income levels and rates of return.

The empirical evidence of the last ten years is all against the assumption of purchasing-power parity, and in turn against the monetarist model, even as an approximate description of short-run or medium-run reality. Two episodes in the recent history of the dollar stand out.

In 1977-78, the dollar depreciated sharply against the yen, the mark, and other European currencies. Contrary to the purchasing-power-parity doctrine, the change in the exchange rate was not at all matched by a change in relative price levels. That is, the dollar depreciated in real terms. Nor did the change in the exchange rate correspond to a change in relative money supplies. Indeed, central banks in Europe and Japan were allowing their money supplies to grow at a substantially *faster* rate than in the United States. While one could always explain the fall in the dollar's value tautologically as a fall in relative U.S. money demand, real income (the most important conventional determinant of money demand) was actually increasing faster in the United States than abroad. The first column of Table 1 shows the relevant numbers.

From 1980 to 1985, the entire process was reversed. The dollar appreciated sharply against the yen, the mark, and other European currencies. The change in the exchange rate was again not matched by a change in relative price levels. The dollar appreciated enormously in real terms. Nor did the change in the exchange rate correspond closely to a change in relative money supplies. While U.S. money growth in the 1980-82 period did drop below the

TABLE 1
 CHANGES IN THE VALUE OF THE DOLLAR AND
 ITS MONETARY DETERMINANTS, 1976-84
 (percentage rate of change in the annual average)

	1976-78	1978-80	1980-82	1982-84
Effective exchange value of the dollar: ^a				
Nominal	- 6.5	- 2.7	+15.5	+9.0
Real	- 6.9	- 0.3	+14.8	+7.4
Consumer price index:				
U.S.	7.1	12.4	8.2	3.8
Average of trading partners	7.4	9.4	8.8	5.4
Difference	- 0.3	+ 3.0	- 0.6	-1.7
Money supply:				
U.S. ^b	7.9	6.9	6.8	9.0
Average of trading partners	13.8	5.8	9.1	8.8
Difference	- 5.9	- 1.1	- 2.3	-0.2
GNP:				
U.S.	5.3	1.3	0.2	5.3
Average	3.6	3.1	1.1	2.7
Difference	+ 1.7	- 1.8	- 0.9	+2.6

^a Federal Reserve Board's multilateral exchange rate.

^b M1 (from *International Economic Conditions*, Federal Reserve Bank of St. Louis).

NOTE: Numbers for trading partners are an average of six countries (Canada, France, Italy, Japan, United Kingdom, and West Germany) using 1980 GDP weights (from OECD *Economic Outlook*).

SOURCES FOR OTHER STATISTICS: IMF *International Finance Statistics* and International DRI FACS financial data base.

growth rate for an average of its trading partners, the difference was only a small fraction of the size of the dollar appreciation, as shown in the third column of Table 1. And from mid-1982 until March 1985, the dollar continued to appreciate even though money growth was as rapid in the United States as abroad. Dornbusch (1982, p. 6) put the nail in the coffin: "By now there are, I believe, no more serious claims for the empirical relevance [of the simple monetarist model]."

The large swings that exchange rates have experienced in the absence of corresponding movements in the fundamentals have led some economists to conclude that exchange rates are not determined by fundamentals. The very high real value of the dollar over the most recent four years is considered to be unjustified.

The numbers clearly support the claim that the dollar is overvalued in some

sense. It is no good giving the noninterventionist's automatic reaction that whatever rate the market comes up with must by definition be the correct rate. But when we use the term "overvalued," we must be prepared to explain what we mean by it. Let us consider further the first two meanings of that term or of the similar term "disequilibrium."

First, "disequilibrium" is often used in economics to mean that the price does not equate current supply and demand. But given the very low levels of transactions costs, capital controls, and other barriers to capital movements among the United States, Canada, Germany, the United Kingdom, and now Japan,¹ such a disequilibrium can be ruled out. Individuals are holding the portfolios they desire. (Exceptions should be made for France and other countries with effective capital controls.) If there is any sense in which the rate can be said to be out of equilibrium, it must be in the alternative mathematical sense of equilibrium in which the exchange rate is not changing over time or at most is changing at a long-run steady-state rate.

According to the second possible meaning of currency overvaluation, the central bank is intervening in the foreign-exchange market, adding to the market demand for the currency in order to keep its price at a higher level than it would otherwise be. Under a system of fixed exchange rates, the central bank is committed to maintain the price by buying up as much of the currency as is necessary, which is the excess supply left over from the private components of the balance of payments. A balance-of-payments deficit is often referred to as a disequilibrium, and it is one in the sense that the situation cannot persist indefinitely, because the central bank will eventually run out of foreign-exchange reserves.

Under floating exchange rates, the overall balance-of-payments deficit is a much less useful concept. It has usually been U.S. policy not to intervene in the foreign-exchange market except to calm disorderly markets, which implies an overall balance of payments equal to zero. While many foreign central banks have continued to intervene in the market, it is no more accurate to say that they are accommodating or financing an imbalance exogeneously determined by the private sector than to say that their exogenous intervention is what allows the private sector to run an imbalance. In any case, intervention in recent years, when it has taken place, has generally been "leaning against the wind." Central banks have fought the 1980-85 appreciation of the dollar by selling dollar reserves in exchange for foreign currencies, rather than the reverse. (This includes Japan; it is ironic that the Japanese government has sometimes been accused of manipulating the yen downward.) It fol-

¹ Contrary to some perceptions, Japan removed most of its controls on capital inflow in 1979. Frankel (1984) analyzes U.S. pressure, from October 1983 to May 1984, to induce Japan to accelerate liberalization of its financial markets, with the supposed goal of reducing the "undervaluation" of the yen.

lows that the United States has technically been running a *surplus* on the overall balance of payments, defined as the sum of the current-account balance and private capital-account balance—not a deficit, as popularly supposed.² Foreign countries are the ones running overall balance-of-payments deficits, financed by central banks' purchases of their currencies. If the dollar is considered currently to be overvalued, then the intervention definition cannot be the one that is meant.

Having thus dismissed the first two possible meanings of overvaluation, the remainder of this essay will consider the other four in more detail, beginning with overshooting and finishing with the normative question. Along the way, we will have the opportunity to visit many of the sites where recent theoretical and empirical research on the economics of exchange rates has been taking place.

3 Overshooting: Overvaluation Due to Short-Term Fundamentals

The third possible meaning of overvaluation is that one can predict on the basis of economic fundamentals that the currency will in the future decline toward some long-run equilibrium. In other words, the exchange rate is subject to dynamics that reflect the influence of short-run fundamentals. This is the phenomenon of overshooting.

Our third definition of overvaluation corresponds to Williamson's (1985, pp. 13-17) definition of misalignment: "a deviation of the market rate from fundamental equilibrium." Williamson intends the definition to connote the criterion for a devaluation under the Bretton Woods system:

Although the term was never formally defined, the IMF's (1970) report on the exchange-rate system implied that fundamental disequilibrium was a situation in which a country could not expect to generate a current account balance to match its underlying capital flow over the cycle without, on the one hand, depressing its income below "internal balance" or imposing trade controls for payments purposes or, on the other hand, importing inflation. . . . [This concept] is also what people usually have in mind when they describe rates as "overvalued" or "undervalued." . . . (pp. 13-14)

The deviation from fundamental equilibrium is seen to hold even though the exchange rate is in "market equilibrium" (there is no intervention, that is, no

² The overall balance of payments obtained by adding the reported current-account deficit to the reported private capital-account surplus has been a large negative number in recent years. However, the statistical discrepancy, almost all of which belongs in the private balance of payments rather than under official reserve transactions, has been approximately as large. In 1982 the statistical discrepancy was the larger of the two, that is, central banks reported net losses of dollar reserve assets. This has not been true continuously. In 1984 central banks reported a slight net acquisition of dollar reserve assets. But this is explained by interest earned by foreign central banks on their dollar reserves. Thus it remains true that central banks have sold dollars, not bought them. Such foreign-exchange intervention has been increasingly evident in 1985.

overvaluation under our second definition). It is also seen to hold even though the exchange rate is very possibly in what Williamson calls "current equilibrium," in that it is properly valued given such temporary factors as interest rates and net foreign-asset positions (the short-run fundamentals that drive the exchange rate away from its fundamental equilibrium, that is, make it overvalued under our third definition).

Overshooting is associated with volatility of the exchange rate. But it is consistent with market efficiency, at least in the sense that one cannot expect to make excess (risk-adjusted) profits out of the dynamics. This will be the case when the expected future depreciation is fully reflected in a positive forward discount and interest-rate differential (with or without a risk premium), which is usually true in the overshooting models. It is another question whether overshooting is consistent with efficiency in the sense that the market rate signals a desirable allocation of real resources in the economy, given macroeconomic policy.

There are two major directions in which the simple monetarist model discussed above can be altered to make it more realistic and give it dynamics that arise from fundamentals so as to produce overshooting. In each case, the dynamics must come from a variable that is not free to jump at a moment in time—so that all the impact of, say, a decrease in the money supply is reflected in the exchange rate instead—but that does adjust gradually over time, thus reversing the initial change in the exchange rate.

Sticky Prices and the Degree of Overshooting

The first direction is to relax the assumption of purchasing-power parity. The variable that is not free to jump is the price level. With sticky prices, a decrease in the nominal money supply is in the first instance a decrease in the real money supply. It raises the real interest rate, inducing an incipient capital inflow and an appreciation of the currency. Both the high real interest rate and the loss in competitiveness reduce the demand for goods and labor. If the market is foresighted, it realizes that the slack economy will reduce prices below their previously expected path, eventually undoing the contraction in the real money supply and with it the overvaluation of the currency. Under the rational-expectations hypothesis, this expectation of future depreciation must be sufficient to offset the interest-rate differential, so that investors cannot expect to make excess profits by holding the assets of one country or the other. The fact that the currency initially appreciates to a level in excess of what is expected in the long run is referred to as exchange-rate overshooting.

This is exactly what happened in the U.S. economy, beginning in 1980. As a result of a reduced rate of growth of the money supply, interest rates rose. The U.S. long-term government bond rate, for example, averaged 13.3 percent over the 1981-82 period, a two-point increase relative to 1980.

It is often difficult to measure the real interest rate, because the expected inflation rate is not directly observable. For this reason, real interest rates are calculated in Table 2 under a wide variety of alternative assumptions. By all four available measures of expected inflation, the expected U.S. inflation rate fell sharply during the 1981-82 period of monetary stringency, so that the real interest rate rose even more than the nominal rate. Nominal and real interest rates also rose among U.S. trading partners, but not by as much. The *differential* between the U.S. real interest rate and a weighted average of those of trading partners (the United Kingdom, France, West Germany, and Japan) rose by 2 to 3 percent in 1981-82, as we can see by various measures in the lower third of Table 2. Furthermore, the differential between the rate of return on equity capital in the United States and abroad also rose sharply, measured by either the dividend/price ratio or the earnings/price ratio in Table 2. In response to the shift in real rates of return, foreigners' demand for U.S. assets increased and the dollar began its steep ascent. Because U.S. producers lost competitiveness on world markets as the dollar rose, the burden of the monetary contraction was not borne exclusively by residential construction, business investment, and other interest-sensitive sectors but was transmitted to the tradable-goods sector as well. Partly as a result, the 1981-82 recession was the deepest of the postwar period.

The overshooting story (Dornbusch, 1976, and Frankel, 1979) is by now a very familiar one. It can be used to explain not only large medium-term swings but also high short-term volatility, as new information about interest rates and other variables comes in every day. However, one point that is occasionally missed is that the instability implied by overshooting is *not* a consequence of "speculation" per se, that is, of the introduction of expectations into the model. Rather, it is solely a consequence of slowly adjusting goods markets.

Let us consider the volatility issue, first by going back to the old elasticity-pessimism view according to which export and import elasticities are so low that the Marshall-Lerner condition fails. If a floating exchange rate were called upon to equilibrate the trade balance by itself, the system would be unstable. A depreciation would raise the cost of imports and cause an initial trade deficit, which is an excess demand for foreign exchange, causing further depreciation, and so on. The empirical evidence is that trade elasticities are in fact high enough to imply technical stability, once some time has been allowed to elapse. But one still needs to introduce capital mobility to get the country through the short run, say the first year. Foreigners will lend to the country to finance its transitory trade deficit. In this sense, capital mobility stabilizes the foreign-exchange market.

What about *speculative* capital flows, considered to be destabilizing by Nurkse (1944) and others since? Speculation presumably refers to investors

TABLE 2
INTEREST-RATE DIFFERENTIALS BETWEEN U.S. AND FOREIGN ASSETS,
AND OTHER MEASURES OF THE EXPECTED RATE OF DOLLAR DEPRECIATION, 1976-85
(percent per annum)

	1976-78	1979-80	1981-82	1983-84	1985
Expected nominal rate of depreciation:					
1.1 One-year interest-rate differential ^a	-0.48	2.29	3.00	1.73	1.15
1.2 One-year forward discount	0.18	2.57	3.34	1.85	1.32
1.3 Ten-year interest-rate differential	-0.50	0.56	1.91	2.47	2.92
1.4 <i>Economist</i> survey ^b	na	na	8.57	8.60	7.12
1.5 American Express survey ^c	0.64	na	6.67	6.99	na
Expected inflation-rate differential:					
2.1 One-year lag	-1.01	3.54	0.88	-0.35	0.06
2.2 Three-year distributed lag	-1.96	2.70	1.89	-0.18	-0.16
2.3 DRI three-year forecast ^d	na	2.20	0.96	0.23	0.15
2.4 OECD two-year forecast ^e	1.42	2.24	0.62	0.61	-0.20
2.5 American Express survey ^f	-0.75	na	4.11	2.68	na
Expected real rate of depreciation:					
1.1-2.1 One-year interest-rate differential	0.53	-1.24	2.12	2.09	1.08
1.3-2.2 Ten-year with distributed lag	1.47	-2.15	0.02	2.64	3.08
1.3-2.3 Ten-year with DRI forecast	na	-1.64	0.95	2.24	2.77
1.3-2.3 Ten-year with OECD forecast	-1.92	-1.68	1.29	1.86	3.12
1.5-2.5 American Express survey	1.39	na	2.56	4.31	na
Dividend/price ratio ^g	na	1.10	1.79	1.65	1.80
Earnings/price ratio ^g	na	1.60	3.99	2.60	3.09

^a Calculated as $\log(1 + i)$. 1985 contains data through June. Rates for Japan are not available for 1976-77.

^b Available at 24 survey dates (see Table A-1 in Frankel and Froot, 1985). From *Economist Financial Report*.

^c Available at 11 survey dates (see Table A-2 in Frankel and Froot, 1985). From *American Express Bank Review*.

^d Averages of same 24 dates as in footnote b, from DRI forecasts.

^e 1976-78 is only December 1978. 1985 is June 1985, from OECD *Economic Outlook*.

^f Available at same 11 survey dates as footnote c, for the United States, United Kingdom, and West Germany. Available at only 4 survey dates (1976-78) for France.

^g End-of-quarter averages. 1979-80 includes data only for 1980. 1985 is end of quarter I, 1985. Foreign ratios represent the aggregate of Europe, Australia, and the Far East, from *Capital International Perspective*, Geneva.

NOTE: The foreign variables are GNP-weighted averages of France, Japan, United Kingdom and West Germany, unless otherwise specified.

SOURCES FOR OTHER STATISTICS: IMF *International Financial Statistics* and Data Resources, Inc., International DRI FACS financial data base.