DOLLAR DEPRECIATION WILL NOT CONTRIBUTE TO U.S. INFLATION

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Over the last 2 years, the dollar has lost one-third of its value against the Euro (depreciated by 33 percent), one-fourth of its value against the British pound and Japanese Yen, and almost one-fifth of its value against the Canadian dollar. Pundits and policymakers concerned with inflation are worried that this broad dollar depreciation will contribute to a re-burst of inflation, and all the problems that an increase in inflation, and subsequent policy steps to reduce inflation again, can create for the economy.

The worry is misplaced. In the United States, at least, dollar depreciation does not cause inflation, nor, when other factors are considered, does it help to predict future inflation.

The argument that currency depreciation causes inflation, repeated frequently in the media and in policy discussions, appears straightforward: if the foreign-currency prices of our imports do not fall, then dollar depreciation automatically raises the dollar prices of our imports. This, the argument goes, automatically raises the average level of prices level in the United States, as measured by the consumer price index or some other measure.

The evidence, however, tells another story. Statistical analysis of inflation in the United States in the last quarter century shows that changes in the foreign-exchange value of the dollar add virtually *nothing* of value to help forecast future inflation, once past levels of inflation and other variables are taken into account.

Specifically, a linear regression of monthly U.S. inflation (as measured by the growth rate of the Consumer Price Index, from mid-1974 through early 2004) on twelve lagged values of inflation, twelve lagged values of the short-term Treasury bill rate, twelve lagged values of "core" inflation (measured by the growth rate of the CPI after removing food and energy prices), and three lagged values of changes in the price of imported crude petroleum, the growth rate of the exchange rate yields estimated coefficients that are economically negligible and statistically insignificant. Details appear in an Appendix.[1]

Nothing is special about the use of the Consumer Price Index to measure inflation, or the use of the Federal Reserve's broad index of the U.S. effective exchange rate: the same conclusions follow from other configurations of variables that measure the same concepts differently, such as the use of another price index to measure inflation, or another measure of the foreign-currency value of the dollar. Similarly, nothing is special about the number of lags, or the extent of time aggregation in the analysis.

Perhaps it should not be surprising that dollar depreciation does not help predict inflation. Changes in exchange rates are much more volatile than inflation, and, as the accompanying figure shows, large swings in the value of the dollar over periods of years (e.g. from 1985-88) have not been accompanied by either contemporaneous or future inflationary episodes.

If the theoretical argument stated above is so compelling, why do the data tell a different story? The answer is that a little extra though shows that the theoretical argument stated above is *not* compelling. It ignores two factors. First, it considers only

[1] Similar conclusions have been reached by other researchers, e.g. Stock and Watson (2003).

the *direct* effects of dollar depreciation while ignoring its *indirect* effects. Second, it ignores the underlying factors that may *cause* depreciation, and thereby it may falsely attribute to depreciation the effects of other underlying forces.

A direct effect of dollar depreciation is a rise in the dollar prices of imported products and services whose foreign-currency prices do not change. If everything else were unchanged, continuing depreciation would thereby create continuing inflation. However, everything else is not unchanged. Given the nominal prices of non-imported goods and services, dollar depreciation raises the *relative* price of foreign products. Changes in relative prices, however, do not cause inflation. Inflation refers to a rise in the *overall average* level of prices. Given the rate of inflation, a change in relative prices means extra-large price increases for some products, along with smaller priced increases – or actual price reductions – for other products. A rise in the relative price of imported products does not feed into inflation if nominal prices of other, non-imported products rise *less* rapidly. Why would these other prices rise less rapidly? For two reasons.

First, other prices rise less rapidly after currency depreciation because increased spending on imports leaves less income available to spend on domestic products, reducing demands for those products, and reducing (or scaling back increases in) their prices.[2] Second, monetary policies may effectively target overall inflation, so that a change in the relative price of imported goods implies an extra-large increase in the nominal prices of imports along with extra-small increases (or decreases) in the nominal prices of other goods. A similar argument applies if monetary effectively targets nominal

[2] This statement applies to depreciations that are not themselves the *result* of higher inflation. Also, this statement assumes that the demand for imports is inelastic, which is true (at least in the short run) in the United States. This statement does not always apply to smaller countries that depend more heavily upon imports (because the larger share of imports tends to make import-demand more price-elastic.).

income. In that case, an increase in the relative price of imports may raise the price level slightly because higher import prices reduce overall real income. However, imports are a small fraction of the total U.S. economy. Consequently, even a large dollar depreciation, as in the past two years, does not lead to a large fall in U.S. real income. So a monetary policy that targets U.S. nominal income would permit only a small rise in the nominal price level. This conclusion would differ for a small country that relies heavily on imports and a monetary policy targeting nominal income; that small country *would* see an overall price level increase as a result of currency depreciation. The evidence for smaller, economies with large international-trade sectors supports this conclusion. However, because the United States has a large economy with a fairly small share of international trade, the real-income effects of changes in its terms of trade are sufficiently small as to play little role in explaining U.S. inflation.

The second reason that the evidence does not support the idea that dollar depreciation creates inflation involves the underlying causes of that depreciation. When depreciation of the dollar reflects an increase in expected future inflation (as it may now, perhaps reflecting concern about the federal government's long-run fiscal position), then a subsequent increase in inflation may appear to result from that depreciation. However, both the deprecation and inflation actually reflect the same underlying change in conditions. Statistical analysis would – correctly – show no connection between depreciation and subsequent inflation if that analysis included other factors (such as past rates of inflation and past increases in interest rates and oil prices) that reflect the increase in expected inflation.

Conclusion.

A simple argument suggests that dollar depreciation may cause inflation, so that the large dollar depreciation seen in the past two years is a warning signal about inflation. However, the evidence does not support that view: once other factors that predict inflation are also included in the analysis, currency depreciation plays essentially no role at all in predicting future inflation. That result is not puzzling because the argument that dollar depreciation leads to inflation is incomplete. That argument considers only direct effects and ignores very real – and empirically important –indirect effects. The recent depreciation of the dollar against all other major currencies may concern policymakers for other reasons, but it should not itself create concern about inflation, and Federal Reserve policy should not be affected by the dollar depreciation.

Appendix

Linear Regression of CPI inflation, monthly data from May 1974 – February 2004

VARIABLE	COEFFICIENT	Std-error	t-stat	Prob.
C	0.58	0.31	1.91	0.06
INFLATION(at lag 1)	0.23	0.07	3.21	0.00
INFLATION(at lag 2)	-0.15	0.07	-2.07	0.04
INFLATION(at lag 3)	0.01	0.07	0.21	0.84
INFLATION(at lag 4)	0.03	0.06	0.51	0.61
INFLATION(at lag 5)	0.02	0.06	0.30	0.76
INFLATION(at lag 6)	0.05	0.07	0.76	0.45
INFLATION(at lag 7)	0.08	0.07	1.31	0.19
INFLATION(at lag 8)	0.05	0.06	0.78	0.44
INFLATION(at lag 9)	0.01	0.06	0.25	0.80
INFLATION(at lag 10)	0.10	0.06	1.82	0.07
INFLATION(at lag 11)	0.10	0.06	1.77	0.08
INFLATION(at lag 12)	-0.06	0.06	-1.10	0.27
TREASURY BILL RATE AT LAG 1)	0.75	0.29	2.57	0.01
TREASURY BILL RATE AT LAG 2)	-0.38	0.49	-0.78	0.44
TREASURY BILL RATE AT LAG 3)	-0.03	0.51	-0.05	0.96
TREASURY BILL RATE AT LAG 4)	0.01	0.52	0.03	0.98
TREASURY BILL RATE AT LAG 5)	-0.38	0.53	-0.72	0.47
TREASURY BILL RATE AT LAG 6)	0.27	0.53	0.51	0.61
TREASURY BILL RATE AT LAG 7)	-0.02	0.53	-0.03	0.97
TREASURY BILL RATE AT LAG 8)	0.28	0.52	0.54	0.59
TREASURY BILL RATE AT LAG 9)	-0.58	0.50	-1.16	0.25
TREASURY BILL RATE AT LAG 10)	0.38	0.50	0.76	0.45
TREASURY BILL RATE AT LAG 11)	-0.75	0.47	-1.58	0.12
TREASURY BILL RATE AT LAG 12)	0.42	0.28	1.53	0.13
CORE INFLATION at lag 1)	0.08	0.09	0.95	0.34
CORE INFLATION at lag 2)	0.28	0.09	3.26	0.00
CORE INFLATION at lag 3)	0.10	0.08	1.15	0.25
CORE INFLATION at lag 4)	-0.09	0.08	-1.13	0.26
CORE INFLATION at lag 5)	0.05	0.08	0.60	0.55
CORE INFLATION at lag 6)	0.02	0.08	0.29	0.77
CORE INFLATION at lag 7)	-0.12	0.08	-1.47	0.14
CORE INFLATION at lag 8)	-0.12	0.08	-1.50	0.14
CORE INFLATION at lag 9)	0.21	0.08	2.74	0.01
CORE INFLATION at lag 10)	0.02	0.08	0.25	0.80
CORE INFLATION at lag 11)	-0.04	0.08	-0.48	0.63
CORE INFLATION at lag 12)	0.00	0.07	-0.01	0.99
% RISE – CRUDE OIL PRICE - LAG 1	13.99	2.24	6.24	0.00
% RISE – CRUDE OIL PRICE - LAG 2	-3.61	2.65	-1.36	0.17
% RISE – CRUDE OIL PRICE - LAG 3	5.44	2.47	2.20	0.03
% CHANGE IN FX RATE - LAG 1	-0.006	0.01	-0.61	0.54
% CHANGE IN FX RATE - LAG 2	0.015	0.01	1.56	0.12
% CHANGE IN FX RATE - LAG 3	-0.016	0.01	-1.65	0.10
% CHANGE IN FX RATE - LAG 4	0.005	0.01	0.47	0.64
% CHANGE IN FX RATE - LAG 5	0.007	0.01	0.66	0.51
% CHANGE IN FX RATE - LAG 6	-0.013	0.01	-1.34	0.18
% CHANGE IN FX RATE - LAG 7	-0.002	0.01	-0.18	0.86
% CHANGE IN FX RATE - LAG 8	-0.008	0.01	-0.86	0.39
% CHANGE IN FX RATE - LAG 9	-0.005	0.01	-0.48	0.63
% CHANGE IN FX RATE - LAG 10	0.011	0.01	1.12	0.26
% CHANGE IN FX RATE - LAG 11	-0.013	0.01	-1.30	0.19
% CHANGE IN FX RATE - LAG 12	0.011	0.01	1.24	0.22

R-squared	0.71	F-statistic	14.88	Prob(F-statistic)	0.000000
Adjusted R-squared	0.67	S.D. dependent var	3.74	S.E. of regression	2.16
Log likelihood	-753.6	Durbin-Watson stat	1.97		

Prob(Fstatistic) for null hypothesis that all coefficients on % CHANGE IN FX RATE are zero 0.42

Exchange rate is the Effective U.S. Exchange Rate, Broad Index, calculated by the Federal Reserve.

Nearly identical results follow from use of the Federal Reserve's major-currency index.

The equation above results from a broader equation with elimination of statistically insignificant independent variables. Coefficients of inflation terms are jointly significant at the .003 level; Coefficients of T-bill rates are jointly significant at the .06 level; Coefficients on core inflation terms are jointly significant at the .02 level; Coefficients of oil-price changes are jointly significant at the .000 level.