

Rate Shocks And The Dollar

Last month's article examined how currency markets react to shocks in U.S. equities. We concluded:

To toss one more hackneyed Wall Street cliché back in their face, we do not have a currency market so much as a market of currencies. The same-day reactions in currencies may not be particularly tradable given that most extreme moves in U.S. equities develop in the New York afternoon, while most extreme moves in currencies are in place by mid-day in London.

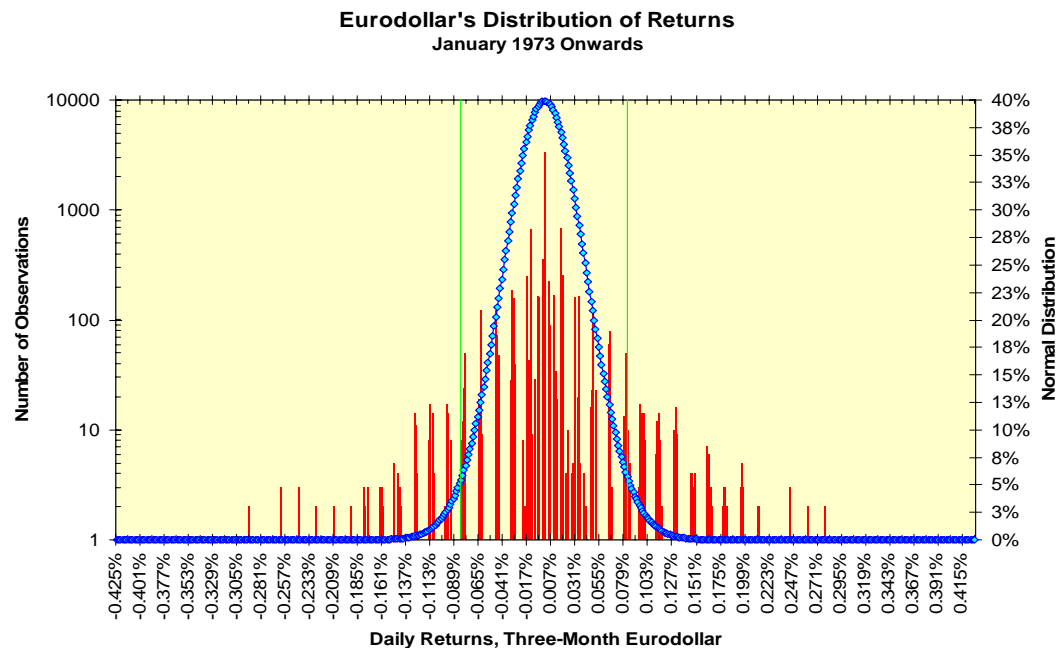
If we move to the next-day reactions, which are highly tradable, we see same-direction reactions in the CAD, and rallies in the other currencies only in reaction to big down days in U.S. stocks. By the time we get to the one-week horizon, the same-direction pattern for the CAD remains, as do the rallies for the DEM/EUR and JPY following U.S. stock market selloffs.

Those who wish to trade currencies on the basis of anticipated changes in U.S. monetary policy following a stock market shock in either direction are advised to be highly selective. Only two patterns really emerge from the data as good rules of thumb: Trade the CAD in the same direction as the stock market shock, and buy the EUR when U.S. stocks fall.

As is often the case in (if we may indulge in some immodesty) scientific inquiries, other questions were raised. After all, if currencies react to short-term interest rates and expectations therefor, we should expect to see some very statistically significant reactions to extreme moves in short-term interest rates.

Data And Methodology

The daily data for three-month Eurodollar (ED3) rates as maintained by the Federal Reserve and converted into a price index, Canadian dollar, British pound, Japanese yen, and the Deutsche mark both as an independent currency and as part of the euro were examined from January 1973 onwards. This is the same currency data set for the currencies as used last month. Each market was converted into daily returns, to be mapped against the sorted returns on the ED3. As the ED3 has had average daily returns of .000014% \pm a standard deviation of .04167% since January 1973, the 95% confidence band lies at daily returns of 0.081687% and -0.081660%. These bands are marked on the chart with green lines.



As before, we will ignore the slice in the middle, which contains 95% of the observations, and focus on the two 2.5% slices of large down and up days. There are 204 large down-days and 238 large up-days in the sample. This was somewhat surprising given the natural skittishness of the interest rate markets, we might have expected a skew toward large down days.

Three separate comparisons of associated currency returns on those extreme days will be made, those for the same day of the ED3 shock, those for the same day plus the next day, and those for the following week. The latter two comparisons are made to see how the shock is absorbed over time in the currency markets.

Same-Day Results

The question whether currency movements in reaction to rate shocks are statistically significant can be answered on two bases. The first is a Student's T-test to assess the probability the means of the small samples, those for currency returns mapped to the ED3's big days, are the same as the mean of the remainder of the population. The second is an F-test to compare the small samples' variances against those of the remainder of the population.

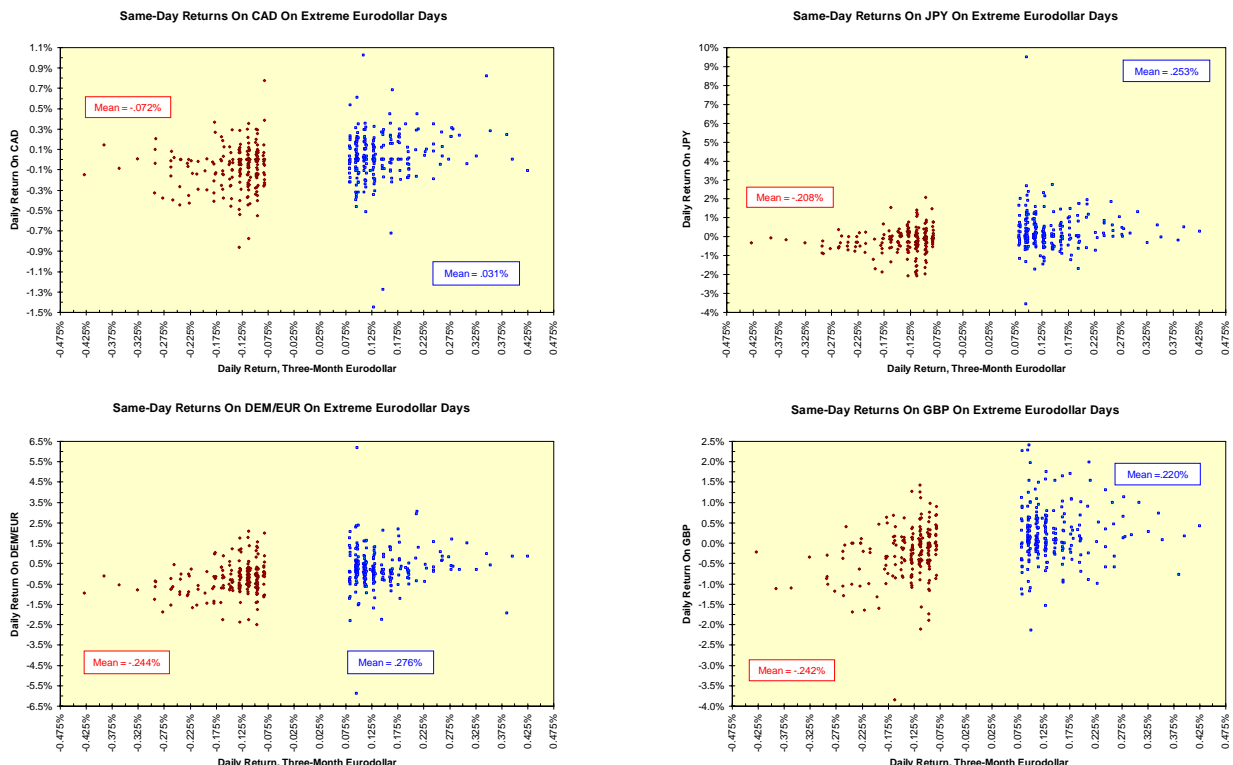
We can look at the table below and say with near 100% certainty that the same-day returns on all four currencies on extreme ED3 days are different from those on normal days with one glaring exception, the variance of the JPY on days when the ED3 has an extreme selloff. On those days, the equation is reversed; we can say with 99.1% certainty the variance is the same as on all other days. If you sensed intuitively the JPY had different drivers than other currencies, you are correct on this one count on a same-day basis.

Same-Day Tests

Probability Large Down Mean = Remainder Mean
 Probability Large Down Variance = Remainder Variance
 Probability Large Up Mean = Remainder Mean
 Probability Large Up Variance = Remainder Variance

	CAD	DEM	GBP	JPY
Probability Large Down Mean = Remainder Mean	0.0%	0.0%	0.0%	0.0%
Probability Large Down Variance = Remainder Variance	0.0%	0.2%	18.5%	99.1%
Probability Large Up Mean = Remainder Mean	3.5%	0.0%	0.0%	0.0%
Probability Large Up Variance = Remainder Variance	0.0%	0.0%	20.2%	0.0%

If we map the same-day returns for the currencies against those for the ED3 on the big down days (red markers on all charts) and the big ED3 up-days (blue markers) we see a yield-dependent shift pattern. Whenever U.S. short-term rates jump by the threshold amount, currencies decline. The opposite is true as well; whenever U.S. short-term rates decline by the threshold amount, currencies rise. Within the up and down clusters, however, there are no internal patterns such as a linear or exponential relationship between the currency's returns and the ED3's returns.



Nothing in these same-day reactions should be considered surprising. If currency movements were nothing more than pure interest rate arbitrage, the results are exactly what we should expect. What we cannot discern from these data, however, is causality. We have no idea whether the ED3's movements lead those of the currencies, whether it lag's those of the currencies or if they occur in a near-simultaneous fashion.

Next-Day Results

Now what happens when we add a second day to the test? After a big move in the ED3, either up or down, the means of the currency returns remain different from those of the rest of the population with a very high degree of confidence. Interestingly, the same can be said for the currency variances as well; even the JPY's variance after the second day of an interest rate shock is different from the population as a whole.

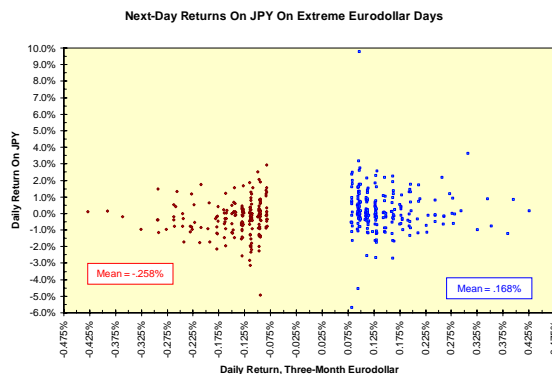
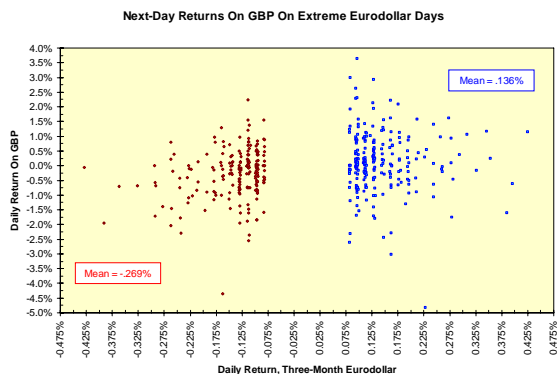
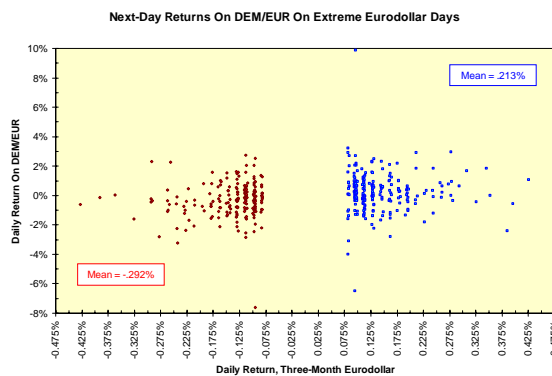
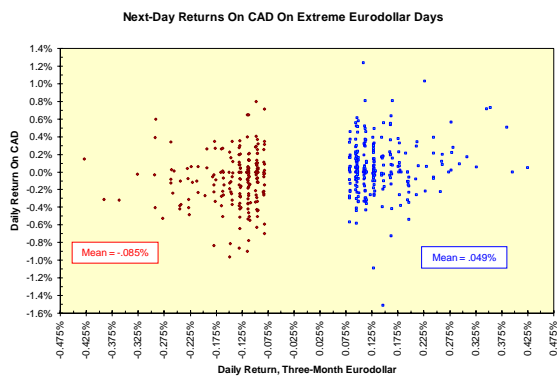
This is extraordinarily useful information. Unlike many market reactions that dissipate quickly, we can confirm that currency reactions to interest rate shocks persist. When U.S. rates jump, go with the dollar's rally for another day, and vice-versa for a downward shock in short-term interest rates.

Two-Day Tests

Probability Large Down Mean = Remainder Mean
 Probability Large Down Variance = Remainder Variance

Probability Large Up Mean = Remainder Mean
 Probability Large Up Variance = Remainder Variance

	CAD	DEM	GBP	JPY
	0.0%	0.0%	0.0%	0.0%
	0.0%	0.0%	25.0%	9.2%
	1.1%	5.0%	4.4%	7.1%
	0.0%	0.0%	1.3%	0.0%



One-Week Results

All trading systems can be classified as either trending or mean-reverting in nature. Suffice it to say most currency traders treat their markets as trending, and with good reason. The expected movements in relative short-term interest rates, relative returns on assets and macroeconomic trends all tend to be persistent.

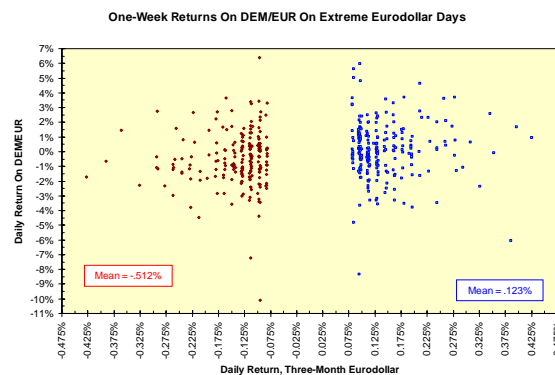
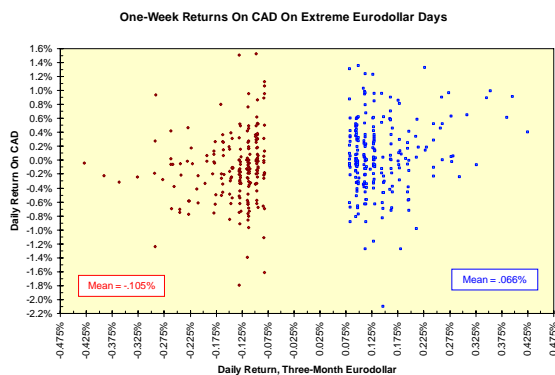
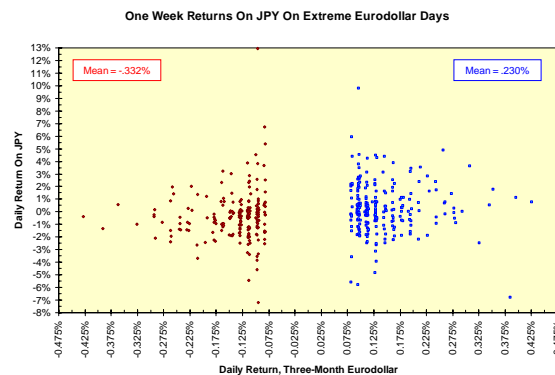
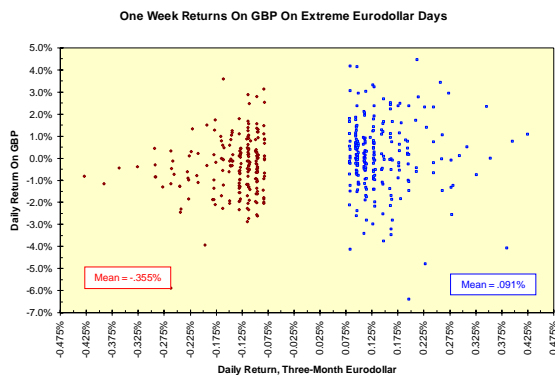
Let's see if this is true for currencies one week after a short-term interest rate shock. For large downward movements in ED3 price – large upward movements in rate – the means of currency returns are significantly different one week later. This relationship is not symmetric. One week after a large downward movement in ED3 price, there are 85.2% and 50.7% probabilities the DEM/EUR and GBP means, respectively, have converged back to those of the population as a whole. The variances are the same.

We can verbalize this as saying the currency market understands that downward movements in U.S. short-term interest rates are going to be limited. There is good resistance at 0%, and it takes exponentially more effort for short-term rates to achieve each additional basis point lower in yield.

One-Week Tests

Probability Large Down Mean = Remainder Mean
 Probability Large Down Variance = Remainder Variance
 Probability Large Up Mean = Remainder Mean
 Probability Large Up Variance = Remainder Variance

	CAD	DEM	GBP	JPY
0.7%	0.0%	0.0%	0.0%	0.3%
0.0%	0.0%	0.0%	8.9%	0.0%
3.3%	85.2%	50.7%	20.6%	
0.0%	0.0%	0.7%	0.0%	



Conclusion

Traders may be used to hearing ambiguous answers or refutations to commonly held beliefs. And commentators enjoy producing them: Who wants to engage in a discourse proving the sky is blue on a sunny day? That is why it is surprising, at least to one writer, that the results of the tests above prove currencies move in the direction dictated by short-term interest rate shocks on the same and next-day and over a one-week timeframe for upward shocks in short-term rates. Downward moves in yield still produce tradable results a week later, but the effect is not so strong.

The next time you see a strong move in short-term interest rates and an expected reaction in the currencies, go with it. It is real, and isn't that a surprise?