Factor Failures

A Columbine Mini-Report
15-May-03

The month of April 2003 saw poor performance from the Columbine research services, caused by the failure of almost all of the individual return factors that drive our models. Several clients have inquired about the frequency of such events—was April extraordinary, merely unusual, or (perish the thought!) typical? We decided to take a look at the historical record of factor failures.

For purposes of this study we defined the "failure" of a factor as an inverted top- minus bottom-decile spread in a given month. The metric is binary—negative spread (less than zero) is a failure, positive spread (including zero) is a success. We computed the monthly return spreads from all of our individual return factors in the *Columbine 1500 Universe* stocks back to 1971 (1990 for the three estimate-driven factors) and analyzed their failures. Since we had different numbers of factors available in different years, we computed a *failure rate*—the percentage of the available factors that failed—to allow us to compare factor failures across time. The higher the rate, the more factors failed: a failure rate of 100% means all factors failed.

Factor Failure Rate History

It turns out that the average monthly factor failure rate over the entire thirty-two year plus period is 37%, with a standard deviation of 23%. That suggests that in a typical month we should expect around three or four of our ten return factors to fail. In any given month the failed factors could easily be as many as six, or as few as two.

Figure 1 plots the monthly factor failure rate over time (expressed as a rolling 12-month average) against the historical mean value of 37%. There have been some fairly wide swings in the rate over the years, but the biggest recorded excursion of the failure rate took place in 1999, at the height of the Tech bubble. Since the bursting of the bubble the rate has returned to a more typical range.

In **Table 1** we report the monthly failure rate by individual return factor and by calendar month. The rate for each factor represents the percentage of months in which that factor has failed over the entire period of the study. Those results are further broken out by individual calendar months, giving a picture of any seasonal variation in each factor's failure rate.

Dividend yield tops the failure list, with a failure rate of almost 50%. In other words, in nearly half of the months for the past thirty years the top- minus bottom-decile spread returns from dividend yield have been negative (high-yield stocks underperformed non-dividend-paying stocks).

In contrast, price momentum, in the form of our proprietary Columbine Alpha Factor, has the lowest failure rate of all the factors studied. Price momentum has a monthly failure rate about half that of dividend yield: 27%. We omitted January spreads for price momentum, since we have long recommended not making use of price momentum at yearend. The failure rate for price momentum is 57.6% in the month of January. Including the January spreads would increase price momentum's overall failure rate to 32%, and would increase the average factor failure rate for all factors by about 0.5%.

Extreme Factor Failure Rates

The factor failure rate for April 2003 was 80%—eight out of ten return factors generated inverted top- minus bottom-decile return spreads in the *Columbine 1500 Universe* stocks. That rate was considerably higher than the historical average of 37%, but just how unusual was it?

Figure 2 plots the distribution of the failure rate levels over the entire period of the study in 10% increments. Each bar represents the number of months in which the factor failure rate was in a particular range. The graph shows that an 80% factor failure rate is not a unique event—unusual, yes, but not unique. Since 1971 there have been thirty-nine months with an 80% or higher failure rate. That's about 10% of the 388 months in the study. There are even four months when *every* factor failed.

Table 2 provides a historical context for these more extreme occurrences. To create the table we extracted every month with a failure rate of 70% or higher from the historical record. The choice of this level was somewhat arbitrary, but it represents a high enough failure rate that nearly all multifactor models, whether driven by momentum or valuation, probably would be adversely affected by the failures. The table simply lists the months and their failure rates in chronological order, and breaks out the frequency of these extreme failures by calendar month and year.

Looking at the history of these extreme failures, a couple of points stand out. First, there are very few clusters of two consecutive extreme failure months. The most common such pairing appears to be October-November, with April-May running second. These four months also are at the top of the calendar month frequency distribution with the most incidents of extreme factor failures. January is high on that list as well. Remember, we have omitted the January price momentum spreads, so this would seem to indicate that the month is troublesome for other factors as well (EPS growth, for example).

Second, the 21st century seems to have generated more than its share of extreme factor failures. There were only four such events in the entire decade of the 1970s, seventeen in the 80s, and twenty-one in the 90s. In the two years and four months since the beginning of 2001 we already have had seven incidents of months with extreme factor failure rates, including two of the October-November clusters.

April 2003 does not stand alone as a freak event. The history of such extreme factor failures suggests that there is about a 1-in-10 chance of a recurrence in any month.

Table 1. Average Monthly Failure Rates by Factor and Month

Results in the Columbine 1500 Universe, 1971 through April, 2003

Factor	All	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
All Factors	37.0%	39.9%	38.7%	38.7%	40.0%	44.3%	35.5%	27.8%	38.3%	31.3%	37.0%	43.3%	35.3%
EPS Change	28.4%	48.5%	27.3%	30.3%	27.3%	43.8%	25.0%	18.8%	21.9%	25.0%	18.8%	25.0%	28.1%
EPS Growth	38.4%	75.8%	42.4%	42.4%	45.5%	46.9%	34.4%	25.0%	40.6%	18.8%	31.3%	37.5%	18.8%
Price Momentum	27.3%	0.0%	27.3%	27.3%	30.3%	43.8%	21.9%	25.0%	40.6%	15.6%	25.0%	43.8%	28.1%
Book Value	43.8%	24.2%	42.4%	24.2%	39.4%	46.9%	53.1%	40.6%	53.1%	50.0%	56.3%	46.9%	50.0%
Cash Flow	38.4%	36.4%	39.4%	27.3%	33.3%	46.9%	43.8%	28.1%	37.5%	40.6%	50.0%	46.9%	31.3%
Dividend Yield	49.7%	57.6%	54.5%	57.6%	63.6%	46.9%	37.5%	31.3%	50.0%	43.8%	40.6%	59.4%	53.1%
Reported EPS Yield	37.4%	36.4%	39.4%	33.3%	39.4%	43.8%	37.5%	31.3%	34.4%	25.0%	40.6%	50.0%	37.5%
EPS Surprise*	36.9%	42.9%	35.7%	21.4%	57.1%	23.1%	46.2%	30.8%	23.1%	61.5%	38.5%	30.8%	30.8%
Estimate Revision*	31.9%	42.9%	42.9%	35.7%	35.7%	30.8%	15.4%	15.4%	23.1%	7.7%	38.5%	69.2%	23.1%
Estimated EPS Yield*	42.5%	50.0%	50.0%	28.6%	42.9%	53.8%	38.5%	30.8%	53.8%	46.2%	38.5%	38.5%	38.5%

** 1990 to date*

Table 2. Extreme Factor Failures: History

Months in which 70% or more of all individual factors failed (negative top-bottom spread)

Universe: Columbine 1500
Period: Jan 1971 through Apr 2003

Year	Month	Failure %
1971	Dec	71%
1973	May	71%
1978	Oct	71%
1980	Nov	71%
1981	May	71%
1982	Aug	71%
1982	Oct	86%
1983	Jan	86%
1983	May	100%
1983	Nov	71%
1983	Dec	71%
1984	Mar	71%
1984	Aug	86%
1985	Jan	71%
1985	Jul	71%
1987	Jan	71%
1987	Feb	71%
1987	May	71%
1988	Dec	71%
1989	Apr	71%
1989	May	100%
1991	Feb	70%
1992	Jan	70%
1993	Oct	100%
1993	Nov	80%
1994	May	80%
1996	Feb	80%
1996	Apr	70%
1996	May	70%
1996	Aug	80%
1997	May	80%
1998	Jan	70%
1998	Apr	80%
1998	Sep	100%
1999	Jan	70%
1999	Mar	90%
1999	Jun	80%
1999	Sep	70%
1999	Nov	80%
1999	Dec	80%
2000	Feb	70%
2000	Jun	70%
2001	Jan	80%
2001	Apr	80%
2001	Oct	70%
2001	Nov	80%
2002	Oct	90%
2002	Nov	90%
2003	Apr	80%

Month	Occurrences
May	8
Jan	7
Nov	6
Apr	5
Oct	5
Feb	4
Dec	4
Aug	3
Mar	2
Jun	2
Sep	2
Jul	1
All	**49**

Year	Occurrences
1999	6
1983	4
1996	4
2001	4
1987	3
1998	3
1982	2
1984	2
1985	2
1989	2
1993	2
2000	2
2002	2
1971	1
1973	1
1978	1
1980	1
1981	1
1988	1
1991	1
1992	1
1994	1
1997	1
2003	1
1972	0
1974	0
1975	0
1976	0
1977	0
1979	0
1986	0
1990	0
1995	0
All	**49**

Figure 1. Factor Failure Rate: Rolling 12-Month Average

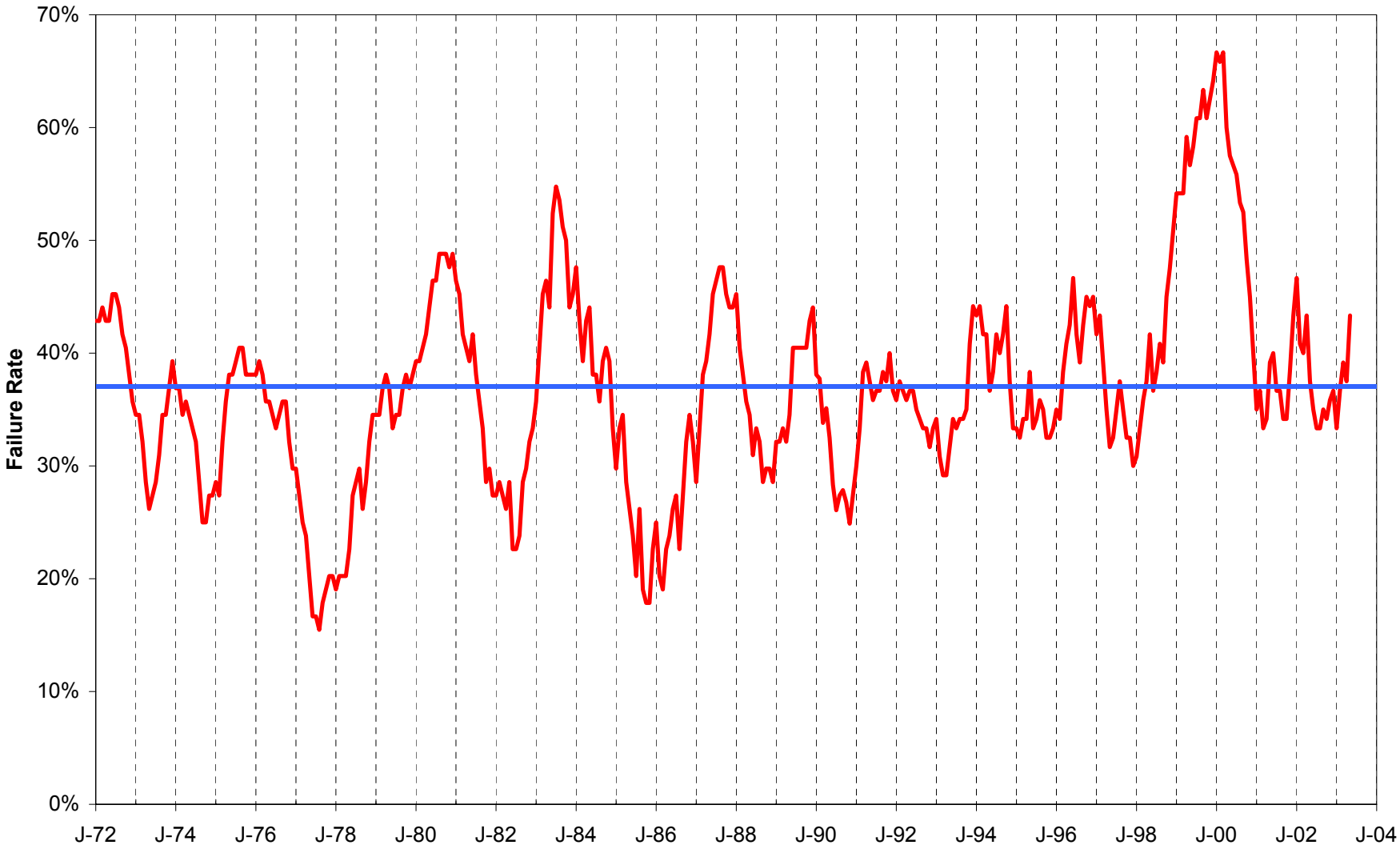

Figure 2. Factor Failure Rate Distribution: 1971-2003