Are the Reports of Beta's Death Premature?

Let's think twice before rushing to discard beta.

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Many would name the concept of beta risk as the single most important contribution of academic researchers to the financial community. At first slow to accept beta, practitioners have come to use it widely as a risk measure and for computing expected returns. In European capital markets, the concept of beta is now beginning to gain popularity. Yet, just as beta seems to be on the verge of widespread use, an article by Fama and French [1992a] has caused both academics and practitioners to re-examine the empirical support for beta's importance.

In retrospect, some earlier studies of beta (Fama and MacBeth [1973]; Black, Jensen, and Scholes [1972]) do not provide conclusive evidence in support of beta. Later studies dating from the 1980s (such as Reinganum [1982]; Lakonishok and Shapiro [1986]; and Ritter and Chopra [1989]) are not able to detect any significant relation between beta and average returns.

The negative findings of these later studies, however, have been largely ignored. The recent study of Fama and French [1992a], which echoes the results of some of these papers from the 1980s, has been interpreted as the final nail in the coffin.

Do we really have sufficient evidence to bury beta? The question assumes added urgency when we consider how dramatically the practice of portfolio management has changed in the last five years.

More money managers, for example, are begin-

ning to use optimization techniques to find efficient portfolios. This trend is still growing, and the technology is being developed to optimize over thousands of assets to form portfolios. One outcome may be that more investors will come to emphasize systematic risk, leading thereby to a tighter relation between returns and beta.

It would be highly ironic if, after continuing to accept beta for twenty years without solid empirical support, we were to discard beta just when the move toward portfolio optimization is gaining speed, and when beta might emerge as an important risk measure.

We should, instead, bear in mind how very difficult it is to draw any definitive conclusions from empirical research on stock returns. Fischer Black [1986] has alerted us all to the pervasive influence of "noise," which clouds our ability to test our theories definitively.

In this article, we examine whether the very noisy and constantly changing environment generating stock returns permits strong statements about the importance of beta. Things instead may be much more complicated, and we may simply have to admit that we are not sure what drives stock returns.

We provide direct evidence on how the limitations of the available data make it difficult to draw firm inferences about the relation between betas and returns, as well as the relation between returns and other variables used in previous studies. By examining the entire history of returns, we also consider the sensitivity of the results to the choice of time period.

There are, of course, numerous reasons why returns might not be related to betas. Roll [1977] and Roll and Ross [1992] emphasize the problems with testing the relation between betas and returns when the true market portfolio is unobservable.

We do not dispute that this difficulty underlies all the existing empirical tests of the CAPM. Our approach is instead pragmatic: we focus on the CAPM as it is used in practice. The standard approach is to specify some broad-based proxy for the market index, calculate betas with respect to this proxy, and relate future returns to these betas. We ask whether high-beta stocks outperform low-beta stocks, and whether the compensation for beta risk is equal to $r_m - r_f$, the rate of return on the market less the risk-free rate, as implied by the Sharpe-Lintner version of the CAPM.

Fama and French [1992a] find no association between returns and betas, even when beta is the only explanatory variable. This is the finding we wish to focus on. In so doing, we exclude from our regressions other variables, such as size and the book-to-market ratio, that have been found to have explanatory power for returns, and focus solely on beta. While it is true that other variables may help to explain returns, there are no firm guidelines as to what variables to include in addition to beta.

Even if there were no compensation for beta risk, this does not mean that betas serve no use for investment decision-making. As long as beta is a stable measure of exposure to market movements, investors should still consider the "beta factor" of a stock.[1] A market timer, for example, would want to be long in high-beta stocks if a rise in the market is expected. A manager who wishes to track a given target portfolio would also have to consider the beta of a stock.

We examine whether betas indeed serve as reliable measures of exposure to market movements. In October 1987, for instance, when the market tumbled by 22%, did high-beta stocks do worse than low-beta stocks? Many institutional investors think of risk in precisely these terms — as sensitivity to market movements.

There is a widespread belief among financial researchers that only risk drives returns. If conventional market betas cannot explain returns, then there must be some other measures of risk that will do the job better. The search is thus on for these multidimensional measures of risk. Given the dangers of this kind of collective data-snooping exercise (Lakonishok and Smidt [1988], Lo and MacKinlay [1990]), however, the results of this search must be taken with a grain of salt.

An alternative explanation for why it is so difficult to detect the relation between risk and return is that other behavioral and institutional factors unrelated to risk may be at work. There is an extensive literature documenting both investors' tendency to over-react over longer horizons (De Bondt and Thaler [1985]), and the existence of momentum over shorter horizons (Jegadeesh and Titman [1993]).

In this article, we study one specific institutional feature: the effect of the trend toward indexed investment and performance evaluation on the prices of stocks in the S&P 500. The rising demand for stocks in the index could result in higher returns for stocks in this exclusive fraternity, unrelated to their riskiness.

Our results should in no way be construed as providing unconditional support for beta's importance

for returns. Rather, our point is that, given the limitations of the data, it is still an open question whether beta is dead or alive as a determinant of expected returns.

NOISY STOCK RETURNS

Twenty years is a long time in financial markets. Needless to say, the horizon of the money management business is very much shorter than twenty years. There are only a handful of countries where it is possible to obtain comprehensive data going back twenty years. Most of the international data bases available to money managers extend back no farther than ten years. Widely used commercial data bases, for example, carry accounting information on Swiss companies from 1986 onward only. Even the data that are available are plagued with problems, as they focus only on surviving companies.

It is thus fair to say that many would feel that having a complete monthly history of twenty years of data on thousands of stocks should be more than adequate to answer the simple question whether there is a significant relation between beta and returns. Yet is twenty years really enough?

One popular procedure to test for the existence of a relation between betas and returns comes from Fama and MacBeth [1973]. Monthly cross-sectional regressions are run relating stock returns to betas. The slope coefficient from each regression is our estimate of the compensation per unit of beta in that particular month. The average of the monthly slopes is thus the estimate of the compensation per unit of beta risk received by investors on average. We can then use the standard deviation of the monthly series on the slope coefficients to examine whether the average slope is statistically significantly different from zero.

Suppose that each month for the last twenty years in the U.S. we follow the standard methodology and run monthly cross-sectional regressions relating returns to betas. Suppose, moreover, that every month we obtain a slope coefficient exactly equal to $r_m - r_f$, the return on the market minus the risk-free rate. This accords perfectly with the Sharpe-Lintner CAPM. Indeed, we cannot obtain a more favorable result than this for the model.

Yet would our regressions reveal that beta plays a significant role in explaining stock returns? From our regressions, we would obtain an annualized average slope coefficient of 5.05%, and an annualized standard deviation of the slope coefficient of 16.58%. The standard procedure is to test whether the average slope coefficient is significantly different from zero. The t-statistic for testing for the significance of the premium for beta risk is 1.36, significant at a level of about 9%. This significance level is not enough to reject the null hypothesis that the premium is zero, given our typical insistence on a 5% significance level.

Given the level of noise in the last twenty years of stock returns, we would need a risk premium of about 7.4% per year before we could reliably reject the null hypothesis. What if the compensation per unit of risk were lower, 4% per year, consistent with the Black [1972] model but still a non-negligible number? How many years then would we need before we could declare the premium statistically significant? We would have to report back to you in sixty-nine years.

Because we assume in this exercise that the premium for beta risk is indeed equal to $r_m - r_f$, what we are doing is the same as testing for the existence of an equity risk premium (i.e., whether stocks do better than T-bills). We thus infer that the annual difference of 5.05% per year does not suffice to reject reliably the null that stocks do not outperform T-bills. A dollar invested in T-bills at the beginning of the twenty-year period in question would have grown to $4.41, while an equivalent investment in stocks would have yielded $9.21. Yet this huge difference is still not statistically significant at the 5% level.

Noise poses a problem in cases beyond testing whether high-beta stocks outperform low-beta stocks. Strategies based on B/M (the book-to-market ratio) have recently gained popularity (Chan, Hamao, and Lakonishok [1991], Fama and French [1992a]). Following this tack, for each year from 1968 to 1990, we form ten portfolios from the universe of NYSE and AMEX stocks, ranked by B/M. We compare the returns of the two extreme portfolios: the portfolio comprising those stocks with the highest B/M ratio, and the portfolio made up of those stocks with the lowest B/M portfolio.

The standard error of the difference is 3.6%, implying that unless the high B/M portfolio outperforms the low B/M portfolio by at least 7.2% a year, the difference will not be significant. Luckily for the partisans of B/M, the difference over the sample period is 8.7%, passing the test of significance.

Strategies developed in hindsight do not ensure

successful future performance for a money manager, however. How confident can one be that high B/M stocks will continue to outperform low B/M stocks at such a pace?

On the one hand, the publicity that we have collectively given to B/M may make high B/M stocks less attractive in the future. On the other hand, if B/M is simply proxying for risk, then we might expect similar returns in the future for high B/M stocks. Many of us, however, have serious doubts whether the extraordinary performance of high B/M stocks can be explained by their riskiness (see Lakonishok, Shleifer, and Vishny [1992a]).

Another popular trading strategy is based on market capitalization. We compare the returns over the period 1979-1991 on the Russell 2000 index to the returns on the S&P 500. The standard error for the difference in returns is 3.63% per year. Unless the return on small stocks is at least twice this much (7.26%) over the return on the S&P 500, we cannot judge the difference to be significant.

As it turns out, the mean returns over the last thirteen years differ by 0.28% per year. This difference does not amount to much — should we conclude that the size effect is dead?

In a different context, take a money manager who outperforms a benchmark by 2% a year, representing an extraordinary feat. Assume that tracking error is 5% a year, which is below the median for active money managers (based on the SEI universe of equity managers).

We would still need to accumulate twenty-five years of data on returns earned by this manager before we can reject the null hypothesis that performance of this magnitude is no better than the benchmark. This example highlights how dangerous our assumption of stability can be. Are we getting twenty years later the same money manager as the one responsible for the extraordinary early performance?

These examples illustrate how difficult it is to make unambiguous inferences from the very noisy and ever-changing environment generating stock returns. While our research is often posed as clear-cut black-and-white statements, we often do not have the luxury of drawing such unqualified conclusions from the data at hand. If a hypothesis is based on a sound theory (some might say "story") and is relatively free of data-snooping biases, it may not be the most productive way to proceed if we insist unthinkingly on a signifi-

cance level of 5% before we can reject the null hypothesis.

TESTS OF THE CAPM

We use all the available data on the monthly Center for Research on Security Prices (CRSP) tape from 1926 to 1991 to examine the relation between beta and returns, following the Fama-MacBeth procedure. The first three years of monthly observations are used in a market model regression to estimate each stock's beta relative to the CRSP value-weighted market index. Our universe is restricted to NYSE and AMEX stocks.

The stocks are then ranked on the basis of the estimated betas and assigned to one of ten portfolios. Portfolio 1 contains stocks with the lowest betas, while Portfolio 10 contains stocks with the highest betas.

The assignment of stocks to portfolios in part reflects measurement errors in the betas. Such errors would result in a "regression to the mean."

To avoid such bias, an intermediate step is necessary: the beta of each stock in a portfolio is re-estimated using the next three years of returns; a portfolio's beta is then a simple average of the betas of the individual stocks assigned to that portfolio. Thus the first three-year period is used to classify stocks to portfolios, and the next three-year period is used to estimate betas for the portfolios.

In each month of the subsequent year, we regress the returns on the ten portfolios on their estimated betas. Note that this is a predictive test in the sense that the explanatory variable (beta) is estimated over a period disjoint from the period over which returns are measured. At the end of the year, we repeat the process of forming portfolios from three years of data, estimating betas over three years, and adding twelve more cross-sectional regressions. Ultimately we obtain 720 cross-sectional regressions.

Exhibit 1 provides summary statistics on the betas for the ten portfolios and their average returns. There is a positive relation between betas and average returns: a finding consistent with a recent paper by Black [1992].

Exhibit 2 provides results from the monthly cross-sectional regressions. The mean estimated slope coefficient is 0.47% per month, with a marginally significant t-statistic of 1.84.[2] Given our standard errors, it is as likely that the compensation per unit of

EXHIBIT 1
Mean, Standard Deviation (in Percent), and Beta of Returns on Portfolios Formed on Beta
January 1932-December 1991

	(Low) 1	2	3	4	5	6	7	8	9	(High) 10
Mean	1.30	1.33	1.32	1.46	1.56	1.59	1.52	1.65	1.54	1.60
Standard Deviation	5.51	6.07	6.55	7.36	7.50	7.87	8.58	9.12	9.08	10.37
Beta	0.90	1.03	1.12	1.25	1.26	1.32	1.44	1.49	1.51	1.70

beta is 0% per year as it is 12% per year. The realized market premium $(r_m - r_f)$ over this period averages 0.76% per month. Thus our estimated premium is 62% of the market excess return, in line with the results of earlier work.

The Sharpe-Lintner CAPM implies that the risk premium is equal to the mean of $(r_m - r_f)$ — the absolute difference between the average slope and the average market excess return is only 29 basis points, so we cannot reject the null hypothesis that the mean slope coefficient is equal to the average market excess return (the t-statistic is -1.15).

In contrast, over the period 1963-1990, Fama and French [1992a] obtain a much lower point estimate for the slope coefficient (0.15% per month), with a t-statistic of 0.46. The case against beta is thus much stronger in Fama and French's sample period.

Upon reflection, however, their finding may not be as striking as it first seems. In order for them to obtain a t-statistic of 2, the compensation per unit of beta risk would have to be 7.83% per year —

undoubtedly on the high side relative to the experience of the last thirty years, or relative to any projection of future returns. So the failure to find a statistically significant role for beta should not come as a total surprise.

Exhibit 3 plots the average cumulative monthly difference between the estimated premium for beta risk and $r_m - r_f$, the value predicted by the Sharpe-Lintner CAPM. We start cumulating the difference from January 1932, although the exhibit focuses on the post-1942 experience.

It is clear from the figure that the relation between betas and returns varies considerably over time. If we were to stop our test in 1982, we would conclude that there is a lot of support for the CAPM. Up until 1982, the estimated compensation for beta
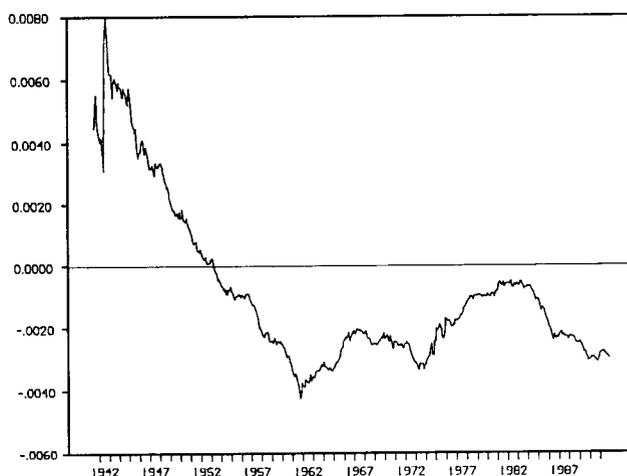
EXHIBIT 3
CUMULATIVE AVERAGE DIFFERENCE BETWEEN ESTIMATED SLOPE AND EXCESS MARKET RETURN — JANUARY 1942-DECEMBER 1991

EXHIBIT 2
Monthly Fama-MacBeth Cross-Sectional Regressions

Sample Period	Intercept	Slope	R^2	T-Test for Slope = $r_m - r_f$
Jan. 1932 - Dec. 1991 ($r_m - r_f = 0.0076$)	0.0059 (3.50)	0.0047 (1.84)	0.48	-1.15
Jan. 1932 - Dec. 1961 ($r_m - r_f = 0.0115$)	0.0075 (2.80)	0.0074 (1.82)	0.48	-1.01
Jan. 1962 - Dec. 1991 ($r_m - r_f = 0.0038$)	0.0042 (2.10)	0.0020 (0.64)	0.47	-0.57
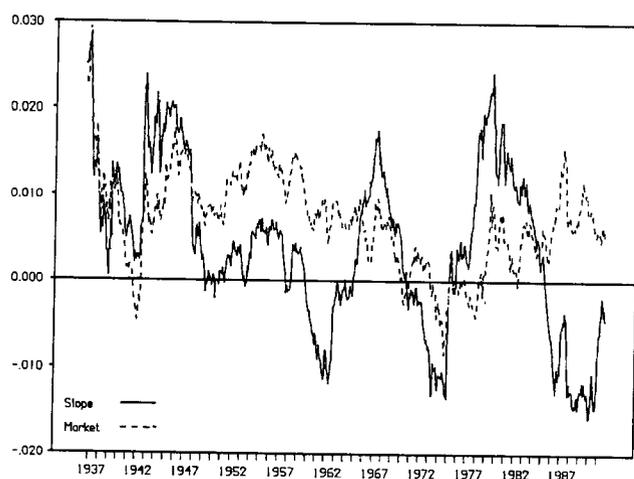
risk is strikingly close to $r_m - r_f$; the average slope is 0.0070 (2.47 times its standard error), while the average market excess return is 0.0076, yielding a minuscule difference of 6 basis points (the t-statistic for the difference is -0.32).

On the other hand, the last nine years have not been kind to beta — the gap between the estimated compensation for beta risk and the realized market premium widens substantially. Exhibit 3 reinforces our earlier discussion of the difficulties posed by noise in the data. The conclusions based on a period of as much as fifty years of data turn out to be quite fragile, given that adding nine years to the sample can dramatically alter our results.

What one takes away from all this depends on one's prior beliefs. A die-hard believer in beta could make a good argument that the poor performance of beta over the last nine years should be viewed as an aberration. During this period small stocks, which tend to have higher betas, have performed poorly relative to larger companies with lower betas, perhaps because, as Fama and French [1992b] suggest, unanticipated economic developments in the recent period had an adverse effect on low-capitalization stocks.

One could, however, with equal ease, argue that it is the earlier period that presents problematic evidence for beta. There appears to be a very strong relation between betas and returns in the earlier years,

even before Markowitz formulated the mean-variance concepts underlying the CAPM. If anything, then, the model seems to work "too well" until the mid-fifties. It is possible that Markowitz's ideas were not so new after all, and the marginal investor knew how to form efficient portfolios long before Markowitz was born.

Exhibit 4 presents five-year moving averages of the estimated slope and the excess return on the market. Each point on the graph represents the average of the last sixty months of observations on the variable. There seems to be a close correlation between the two series for much of the sample period. For whatever reason, the most pronounced discrepancy appears in the more recent period, as noted above.

THE IMPORTANCE OF THE BETA FACTOR

The noisy, dynamic environment generating stock returns clouds our ability to reach firm conclusions with respect to the compensation for beta risk. It may be a less difficult task to verify whether the beta factor is important in driving stock returns. In particular, the case for beta would be more plausible if it were indeed true that stocks with high betas represent higher risk than stocks with low betas.

Extensive conversations with money managers suggest that downside risk is their major concern. Since beta represents the sensitivity of a stock's return to market rises and declines, it should be a good measure of downside risk. If, for example, stock prices were to fall in general, the prices of high-beta stocks should decline more than the prices of low-beta stocks.

There is no automatic presumption that this should be so — there may, for instance, be other factors driving stock returns, and these factors may change in such a way as to distort the association between market movements and the movement in individual stock prices. Another possibility is that the relation between past betas and future betas is unstable.

In order to address this issue, Exhibit 5 presents the experience of the ten largest "down-market" months (a down-market month is a month when $r_m - r_f$ is negative). These are precisely the sort of months that cause sleepless nights for investors.

For each of these ten months, we report the excess market return, the coefficients and R^2 of the cross-sectional regression, and the returns on the ten beta-sorted portfolios. In each month, the returns on

EXHIBIT 5

Ten Largest Down-Market Months: Excess Market Return ($r_m - r_f$), Estimated Cross-Sectional Slope, R^2, and Returns on Portfolios Formed on Beta

	Month	Market	Slope	R^2	(Low) 1	2	3	4	5	6	7	8	9	(High) 10
1	3/38	-23.61	-16.06	96.50	-19.35	-21.17	-24.24	-27.06	-28.58	-32.77	-32.67	-35.36	-37.72	-37.13
2	10/87	-22.43	-22.59	83.20	-17.10	-16.88	-25.70	-26.88	-25.90	-27.46	-29.79	-30.08	-29.70	-33.76
3	5/40	-22.00	-5.38	83.74	-22.10	-24.63	-25.44	-25.68	-27.07	-28.61	-29.24	-26.73	-31.77	-30.51
4	5/32	-20.75	-8.43	27.00	-20.88	-20.02	-25.31	-21.32	-18.95	-16.45	-21.09	-21.10	-22.08	-27.74
5	4/32	-18.11	-4.84	28.90	-19.46	-16.33	-18.17	-19.07	-18.30	-22.58	-20.84	-20.59	-20.72	-20.06
6	9/37	-13.52	-9.27	96.56	-10.82	-14.44	-14.71	-16.40	-20.25	-20.96	-22.63	-22.52	-24.82	-26.36
7	2/33	-13.28	-13.08	76.44	-7.05	-8.93	-12.20	-9.75	-12.47	-12.13	-13.73	-12.18	-19.19	-17.47
8	10/32	-13.06	-14.93	60.85	-11.60	-15.83	-16.38	-19.86	-14.39	-15.22	-22.32	-20.52	-17.36	-23.45
9	3/80	-12.80	-8.40	92.33	-12.14	-13.33	-11.64	-14.79	-13.49	-14.21	-15.54	-15.96	-17.40	-19.26
10	11/73	-12.33	-12.58	94.49	-9.13	-12.05	-12.26	-16.05	-14.90	-17.92	-19.01	-19.42	-20.76	-23.54
Average		-17.19	-11.56	74.00	-14.96	-16.36	-19.00	-19.68	-19.43	-20.83	-22.69	-22.45	-24.15	-25.93

the ten portfolios are nearly monotonically related to their betas. On average, the R^2 is a remarkable 74%.

October 1987 is still fresh in the memories of many: in that month the excess market return is -22.43%, compared to the estimated slope of -22.59%. The returns on the ten beta-sorted portfolios are all negative, ranging from -17.10% for the portfolio with the lowest beta to -33.76% for the portfolio with the highest beta (a difference of 16.66 percentage points). The R^2 of the cross-sectional regression is 83%.

The results for the ten largest up-market months in Exhibit 6 are qualitatively similar. In months when the market falls (rises), investors in high-beta stocks do indeed experience larger losses (gains)

than investors holding low-beta stocks.

More generally, Exhibit 7 provides averages of the cross-sectional slope coefficients across all down-market and all up-market months. In the down-market subsample (Panel A), the average excess return on the market is -3.81% per month. With this large a "signal," it should become easier to detect whether the beta factor is important. The average slope in this subsample is -3.55% per month, remarkably close to the average market excess return.

Panel B of Exhibit 7 performs the same exercise with respect to the up-market months (where the market excess return $r_m - r_f$ is positive). Once more we see a close correspondence between the average

EXHIBIT 6

Ten Largest Up-Market Months: Excess Market Return ($r_m - r_f$), Estimated Cross-Sectional Slope, R^2, and Returns on Portfolios Formed on Beta

	Month	Market	Slope	R^2	(Low) 1	2	3	4	5	6	7	8	9	(High) 10
1	4/33	38.18	45.83	72.21	37.84	44.73	36.40	47.57	47.84	74.40	54.56	58.67	60.08	72.34
2	8/32	36.45	60.30	56.05	49.06	54.76	61.02	81.73	47.75	43.92	64.07	86.44	61.58	84.96
3	7/32	33.06	19.97	28.28	38.93	46.62	47.46	52.70	50.13	40.57	62.93	44.26	49.72	57.70
4	6/38	23.54	22.96	96.93	16.98	18.57	23.34	28.09	34.32	35.17	37.81	39.18	40.98	43.33
5	5/33	21.07	14.67	21.92	43.56	50.31	49.34	50.35	69.25	59.17	57.30	57.53	46.55	59.28
6	10/74	16.02	-2.43	26.59	10.90	13.83	13.42	13.88	8.82	11.49	10.95	12.17	8.51	10.25
7	9/39	15.94	49.96	86.40	6.96	17.87	23.21	36.35	40.09	46.20	69.01	64.49	53.48	56.93
8	4/38	14.53	17.26	73.52	13.85	15.20	18.96	19.88	18.45	23.45	22.72	23.13	27.83	42.41
9	6/33	13.35	19.54	48.04	13.92	19.19	14.59	13.04	23.82	24.53	34.15	25.37	22.77	28.79
10	1/75	13.32	37.02	65.14	23.84	20.68	22.51	21.52	29.06	31.18	33.15	31.90	40.10	42.89
Average		22.55	28.51	57.51	25.58	30.18	31.02	36.48	36.95	39.01	44.66	44.31	41.16	49.89

EXHIBIT 7

Cross-Sectional Regression Results and Excess Return on
Market, Classified by Down-Market Months (where $(r_m - r_f)$
< 0) and Up-Market Months (where $(r_m - r_f)$ > 0)

Sample Period	Intercept	Slope	R^2	$r_m - r_f$
(A) Down-Market Months				
All Down Months	-0.0008	-0.0355	0.54	-0.0381
(292 Months)	(-0.34)	(-13.98)		
Large Down Months[a]	-0.0092	-0.0524	0.63	-0.0626
(146 Months)	(-2.56)	(-14.19)		
Small Down Months[b]	0.0076	-0.0186	0.45	-0.0136
(146 Months)	(2.94)	(-6.45)		
(B) Up-Market Months				
All Up Months	0.0104	0.0321	0.44	0.0388
(428 Months)	(4.46)	(9.62)		
Large Up Months	0.0139	0.0530	0.51	0.0625
(214 Months)	(3.49)	(9.20)		
Small Up Months	0.0069	0.0112	0.37	0.0151
(214 Months)	(2.86)	(4.14)		

[a] A large down- (up-) month is defined as a month where $(r_m - r_f)$
is larger in magnitude than the median of those observations that
are negative (positive).

[b] A small down- (up-) month is defined as a month where $(r_m - r_f)$
is smaller in magnitude than the median of those observations that
are negative (positive).

realized premium (3.88%) and the average slope
(3.21%).

Note that in both the up-market and down-
market subsamples, the estimated slope is close to the
realized market premium in magnitude: the sub-
sample slopes are 93% and 83% of the market excess
return in down- and up-market months, respectively.
Even a small relative difference between the estimated
slope and the excess market return in down- or up-
market months, however, translates into being off by
29 basis points when pooled over the entire sample
(Exhibit 8).

The statistical researcher who is aware of the
stability of covariances between portfolio returns will
find little that is surprising in Exhibits 5-7. That the
message is familiar to some, however, does not make it
any less worthy of repetition — it is our experience, in
particular, that the majority of professional money
managers are struck by how well the beta factor fares

in predicting which portfolios will take the biggest
beating in down-markets. Beta can thus be useful to
any investor who casts risk in terms of downside expo-
sure. More generally, a stock's beta would be relevant
to a market timer, or an investor tracking a target port-
folio.

We should stress, however, that our strong
results for down- and up-market months should not be
taken as evidence that, on average, high-beta stocks
necessarily earn higher returns than low-beta stocks.
The estimated coefficients tend to move in the same
direction as the market premium, so that the slope is
high (low) when $r_m - r_f$ is high (low).

In a regression of the monthly observations of
the cross-sectional slopes on the monthly market
excess return $r_m - r_f$ over the period January 1932 to
December 1991, the intercept is -0.0023, and the
slope coefficient of the regression is 0.91, which is
impressively close to 1.0. The R^2 of the regression is
0.52, which is remarkably high, given the variability in
monthly rates of return.

The estimated monthly cross-sectional slope
does not exactly match the excess market return,
however, so it might be the case that when averaged
across all market cycles high-beta stocks do not neces-
sarily earn higher returns than low-beta stocks. Our
results in this section are thus consistent with alterna-
tive factor models of returns that feature no compensa-
tion for beta.

EXHIBIT 8
**ESTIMATED SLOPE AND EXCESS RETURN ON
MARKET FOR ALL UP- AND DOWN-MARKETS**
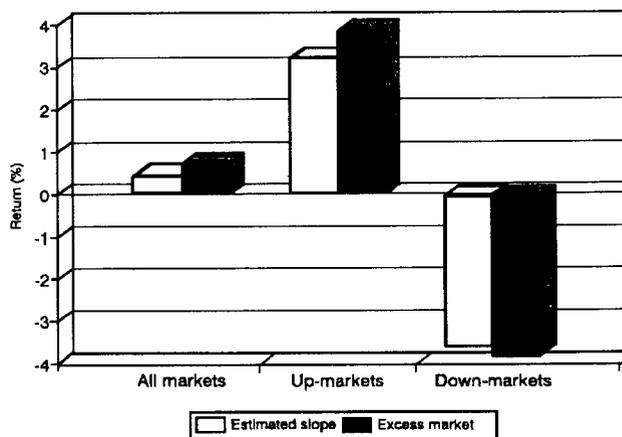
One example is a factor model of the form

$$r_{it} - r_{ft} = k + b_i[r_{mt} - r_{ft} - E(r_{mt} - r_{ft})] + e_{it}, \quad (1)$$

where $E(\ )$ is the expectation operator, and e_{it} is an error term uncorrelated with the market. Here the slope of any monthly cross-sectional regression differs from the excess market return only by a constant, yet expected returns are not related to betas but are constant across stocks.

If we were handed a realization of this factor model where the average excess market return $r_m - r_f$ is high (say, 10% per year), we would find that high-beta stocks outperform low-beta stocks. We would be led to conclude — incorrectly — that beta is a highly significant variable determining expected returns.

The question remains, however, whether this realization corresponds with "normal" experience, and whether beta will still be a significant explanatory variable for expected returns in a more representative environment, where the excess market return is more likely to be 5% per year. This point is particularly relevant for tests of the CAPM applied to foreign markets, where sample periods are relatively short and hence not necessarily representative of the normal experience of these markets.

While the beta factor is important, therefore, it may not necessarily be priced. Nonetheless, if enough investors become aware of the close correspondence between beta and downside risk, they may require a higher return for holding a stock with a higher beta, so beta may ultimately play a more important role for the pricing of stocks.

Even if high-beta stocks in the future earn higher returns, however, the compensation for beta risk may still not equal $r_m - r_f$. Investors may be unable or unwilling (Black [1972, 1992]) to take on sufficient leverage to exploit divergences from the compensation predicted by an equilibrium model.

Furthermore, as long as the performance of investment managers is evaluated relative to an index such as the S&P 500, active money managers may prefer stocks with high betas, thereby bidding up their prices relative to stocks with low betas. The latter possibility illustrates the potential impact of institutional or behavioral considerations ("investor psychology" in Black's [1992] discussion) on stock returns.

THE S&P INDEX EFFECT ON STOCK RETURNS

The discussion so far indicates that it might be premature to bury beta. If we focus on the point estimates, however, all the existing evidence suggests that the estimated risk premium is smaller than predicted by the Sharpe-Lintner model.

It is of course possible that beta is a very poor measure of risk, and much better risk measures exist but have not been uncovered. When we uncover these superior measures of risk, we will fully understand the relation between return and risk.

An alternative explanation is that behavioral and institutional factors, unrelated to risk, play a major role in generating stock returns, thereby confounding the relation between risk and return (Shleifer and Summers [1990]). A recent article by Lakonishok, Shleifer, and Vishny [1992b] discusses the complicated agency relations within the money management industry. One aspect of these many conflicts of interest is that risk might mean different things to different parties.

For example, a plan sponsor might view the risk of the portfolio in terms of the standard deviation of its return. The money manager, whose performance is being evaluated relative to the S&P 500 index, is more concerned about tracking error. This concern with tracking error is not unreasonable, given the very short horizons in the money management industry.

Robert Haugen, for example, has analyzed the properties of the minimum-variance portfolio, using various time periods and samples of stocks. The out-of-sample returns of his "efficient portfolio" are on average no lower than that of the S&P 500, but the volatility is much lower.

Imagine that we can expect in the future the same performance from Haugen's minimum-variance portfolio as in the past. Would everybody flock to this portfolio? What about tracking error? If the benchmark is the S&P 500, quite a few money managers will understand that such a strategy is risky, as the tracking error is quite large.

We investigate one particular institutional aspect of equity markets and its effect on stock prices. There are good reasons to believe that over the past decade there is a positive effect on stock returns associated with being in the S&P 500 index. First, indexation has become a big industry. For example, in 1980 only

EXHIBIT 9
The "S&P Index Effect" on Stock Returns, 1977-1991

Year	Excess Return (%) on S&P 500
1977	-3.99
1978	-4.85
1979	5.33
1980	2.39
1981	3.17
1982	6.94
1983	1.58
1984	4.69
1985	-0.08
1986	2.21
1987	5.92
1988	3.45
1989	4.87
1990	-2.94
1991	4.15
Average	2.19
T-Statistic	2.33

about 2% of the equity investment of the top 200 pension funds was indexed to the S&P 500; the number now is close to 20%, even without counting the closet indexers.

Second, the emphasis on performance evaluation is now much stronger than it was ten or fifteen years ago, and the S&P 500 index is, without any doubt, the most popular benchmark for performance evaluation. These reasons have prompted an additional demand for stocks belonging to the exclusive fraternity of the S&P index. Does this extra demand translate to higher returns from belonging to the index?

Our sample period is 1977-1991, and the universe comprises all NYSE, AMEX, and NASDAQ stocks whose market capitalization exceeds $50 million (1991) dollars. Every year, we run a cross-sectional regression with the annual holding-period return on each stock as the dependent variable.

The explanatory variables are: the beta of the stock, its market capitalization, its book-to-market-ratio, a dummy variable for the stock's industry classification, and a dummy variable for whether the stock is included in the S&P 500 index. All our explanatory variables are measured at the end of the year prior to the interval over which returns are measured. We thus try to control for all the other generally accepted influ-

ences on stock returns when examining the excess return from belonging to the exclusive S&P club.

Exhibit 9 presents the yearly estimates of the coefficient of the dummy variable for S&P membership. Even after controlling for all the other influences, we find a sizable average excess return of 2.19% per year. The excess return is highly significant (the t-statistic is 2.33), and is consistent with the notion that institutional factors unrelated to risk play an important role.

The premium for membership in the index is impressive, amounting to almost half the average annual market excess return $r_m - r_f$ (5.77%) over this period. The average excess return for S&P membership in the period beginning in 1980, when indexation really began to catch on, is even more striking at 3.03% (the t-statistic is 3.90).

It is interesting to speculate on how the S&P index effect may show up in future stock returns. Given the performance of active money managers, one possibility is that the shift toward indexation will continue. In this case, extra buying pressure may continue in the future to produce excess returns from belonging to the index (assuming that the expected future price pressure has not already been incorporated into current stock prices).

Another possibility is that the push for indexation has passed its peak. If so, the question arises as to whether the stocks in the index are overpriced. Insofar as membership in the index has bestowed an average excess return of 2.19% per year for the last fifteen years, one might argue that a correction in prices is due for these stocks.

SUMMARY AND CONCLUSIONS

Although the empirical support for beta was never strong, most of us have accepted beta unquestioningly for many years as a measure of risk. The tide now seems to be turning against beta; many of us seem ready to discard beta and to begin searching for better risk measures. This collective data-snooping exercise poses grave dangers and raises doubts whether the outcome will be "true" measures of risk.

We have tried here to evaluate whether we truly have sufficient evidence to dump beta. When we began this research, the case for beta seemed to us tenuous. Upon finishing it, we have by no means become die-hard supporters of beta, but we also do

not feel that the evidence for discarding beta is clear-cut and overwhelming.

The inconclusive nature of the results has to do with the very noisy and constantly changing environment generating stock returns. The noise is so pervasive that even if returns and betas are indeed related, as implied by the CAPM over the last twenty years, we would still not be able to reject the hypothesis that returns and betas are unrelated, at standard levels of statistical significance. This is the case even though the realized premium on the market over this period is 5.05%.

If we were to plead the case for beta before a jury, we would emphasize these findings of our study:

1. If we use the entire CRSP history of stock returns in the U.S., the estimated average compensation for beta risk is 0.47% per month and is close to being significant. Moreover, the estimated compensation is not significantly different from the average excess return on the market $(r_m - r_f)$ of 0.76% per month.

2. If we were to stop the study in 1982, the support for beta would be overwhelming. The last nine years, which have not been favorable for beta's explanatory role for returns, are an aberration.

3. Examination of the monthly behavior of the estimated and actual premiums indicates a close association between the two variables, in line with the Sharpe-Lintner CAPM. For example, in months when the market takes a deep dive, high-beta stocks substantially underperform low-beta stocks.

On the other hand, a prosecuting attorney could use the same results to discredit beta's importance for returns:

1. Even with sixty years of data on returns, spanning many generations of money managers, the t-statistic for the estimated average compensation for beta risk is a paltry 1.84.

2. The most recent period, which is perhaps more representative of current experience, provides much weaker support for beta. To drive the point home, the strongest support for beta comes from the earlier period, long before Markowitz's findings on forming stocks into efficient portfolios.

3. Including other variables may substantially diminish beta's role in explaining stock returns.

What is the verdict? The data simply do not lend themselves to a clear-cut conclusion either way. To complicate the situation further, it very well may be the case that returns are driven not only by risk but also by a host of other institutional and behavioral aspects of equity markets. The extremely strong effect we find from membership in the S&P 500 index is but one example of the many other possible confounding influences from institutional or behavioral factors.

ENDNOTES

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[1] By "beta factor," we mean more precisely the market factor underlying returns; beta is the sensitivity to this market factor. This usage appears frequently in the literature.

[2] Some researchers have argued that the relation between beta and returns may be stronger at the level of an annual holding period, rather than a monthly holding period. We also checked for this possibility by replicating the results of Exhibit 2 using annual as well as semiannual and quarterly holding periods. The general conclusions remain unchanged. For example, over the sample period 1932-1991, the average estimated slope coefficient is 0.0368 (with a t-statistic of 1.08) for annual returns. For semiannual and quarterly returns, the average estimated slope coefficients are 0.0262 (corresponding to 5.24% on an annualized basis, with a t-statistic of 1.46), and 0.0136 (or 5.44% per year, with a t-statistic of 1.49), respectively.

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