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Many would consider the concept of beta risk to be the single most important contribution made by academic researchers to the financial community. Although practitioners have been slow to accept beta, they have now come to use it widely as a risk measure and for computing expected returns. In some 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, a recent highly influential paper by Fama and French (1992) has forced both academics and practitioners to re-examine the empirical support for beta's importance.

In retrospect, even the 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), 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 (1992), which echoes the results of some of these papers from the 1980s, has received a tremendous amount of publicity and has been interpreted as the final nail in the coffin of beta.

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. An increasing number of money managers are beginning to use optimization techniques to find efficient portfolios. The trend towards portfolio optimization is still growing, and the technology is being developed to optimize over thousands of assets to form portfolios. One outcome of this trend 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 towards 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 (1987) has alerted us all to the pervasive influence of "noise," clouding our ability to test our theories definitively. In this paper, 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), 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 out-perform 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 (1992) 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, which 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, it 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"[1] of a stock. 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 percent, did high-beta stocks do much 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 multi-dimensional 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 investors' tendency to over-react over longer horizons (DeBondt and Thaler (1985)), and the existence of momentum over shorter horizons (Jegadeesh and Titman (1992)). In this paper, we study one specific institutional feature -- in particular, the effect of the trend towards indexed investment and performance evaluation on the prices of stocks in the S&P 500. In particular, 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 very much an open question whether beta is dead or alive as a determinant of expected returns.

I. 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 databases available to money managers extend back no further than ten years. One very widely used commercial database, DataStream International, for example, carries accounting information on Swiss companies from 1986 onwards only. Even the data that are available are plagued with problems since 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 of 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 is due to 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 our 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.

Let's conduct the following thought exercise. 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. Nonetheless, 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 percent and an annualized standard deviation of the slope coefficient of 16.58 percent. The standard procedure is to test whether the average slope coefficient is significantly different from zero. The t-statistic for testing for the signifance of the premium for beta risk is 1.36, and is significant at a level of about 9 percent. This significance level is not enough to reject the null hypothesis that the premium is zero, given our typical insistence on a 5 percent significance level. In light of the level of noise in the last twenty years of stock returns, we would need a risk premium of about 7.4 percent per year before we could reliably reject the null hypothesis. What if the compensation per unit of risk were lower, 4 percent per year, consistent with the Black (1972) model but still a non-negligible number: how many years would we need before we could declare the premium statistically significant? We would have to report back to you in 69 years.

Since we assumed in the above 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 percent per year does not suffice to reject reliably the null that stocks do not out-perform 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. Nonetheless, this huge difference is still not statistically significant at the 5 percent 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 (1992)). We conducted the following experiment. 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 percent, implying that unless the high B/M portfolio outperforms the low B/M portfolio by at least 7.2 percent a year, the difference will not be significant. Luckily for the partisans of B/M, the difference over the sample period is 8.7 percent, 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 out-perform 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 very serious doubts whether the extraordinary performance of high B/M stocks can be explained by their riskiness.

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 percent per year. Unless the return on small stocks is at least twice this much (7.26 percent) 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 13 years differ by 0.28 percent 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 his benchmark by 2 percent a year, representing quite an extraordinary feat. Assume that his tracking error is 5 percent 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 25 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?

In sum, 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 clearcut 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 significance level of five percent before we can reject the null hypothesis.

2. Tests of the CAPM

We use all the available data on the monthly CRSP tape from 1926 to 1991 to examine the relation between beta and returns. We employ 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 porfolio 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.

Table 1 provides summary statistics on the betas for the ten porfolios and their average returns. There is a positive relation between betas and average returns: a finding consistent with a recent paper by Black (1992). Table 2 provides results from the monthly cross-sectional regressions. The mean estimated slope coefficient is 0.47 percent per month, with a marginally significant t-statistic of 1.84. The realized market premium $(r_m - r_f)$ over this period averages 0.76 percent per month. Thus our estimated premium is 62 percent 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 (1992) obtain a much lower point estimate for the slope coefficient (0.15 percent 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 percent 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.

Figure 1 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. 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 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 miniscule difference of six basis points (the t-statistic for their 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. Figure 1 reinforces our earlier discussion of the difficulties posed by noise in the data. The conclusions based on a period of as much as 50 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 (1992) 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.

Figure 2 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.

There is yet another avenue to explore that may help to raise our confidence in the validity of the CAPM. Consider again our original example: suppose each month, the slope coefficient relating returns to betas is equal to $(r_m - r_f)$. However, the particular realization that we are handed is such that the average excess return on the market is zero, with variability close to its historical level. If we were to apply the cross-sectional regression methods described in the previous section to this particular realization, we would conclude that the average estimated premium is small and not statistically significant. Given this realization, we would conclude that beta is dead -- average returns are not related to betas. But this specific realization is a particularly poor choice for testing the CAPM -- under the CAPM, we would indeed not expect to find any difference between the returns on high- versus low-beta stocks, in light of the very small realized market premium we have been handed. We are not at a complete loss, however, for ways of testing the CAPM. If, instead, we were to plot the time series of estimated slopes along with the time series of the excess market return, we would come to realize that the slope coefficient from our cross-sectional regression coincides, each and every month, with the value predicted by the Sharpe-Lintner model, $r_m - r_f$. In the ideal case, the two lines would lie on top of each other; the two series are identical. No stronger evidence in favor of the Sharpe-Lintner CAPM can be imagined! Given that we can expect equities to out-perform T-bills, our evidence would thus lead to the conclusion that high-beta stocks can be expected to have higher returns than low-beta stock.

Things are of course never quite as simple as the ideal case: the stock market is much more capricious than any simple scenario might suggest. Yet the point remains that considering only the average of the fitted slopes might do injustice to the explanatory role of beta -- we are discarding important information about how the estimated risk premium matches up, period by period, against the actual market excess return, $r_m - r_f$. The average estimated premium may be small and indeed the true slope of the risk-return relation need not equal $r_m - r_f$ (if for example the Black (1972) version of the CAPM were to hold). But a strong tendency for the estimated slopes to move with $r_m - r_f$ would shift our views more towards the CAPM; the absence of any such association would shift them in the opposite direction.

Table 3 reports the regression of the monthly observations on the cross-sectional slopes on the monthly market excess return $r_m - r_f$, using the same sample periods as in Table 2. The slope coefficient of this regression is impressively close to one, suggesting that the estimated compensation for beta risk and $r_m - r_f$ track each other almost one-for-one. The R-square for the regression is also remarkably high, given the variability in monthly rates of return. The evidence for the Sharpe-Lintner CAPM is weaker in the regression covering the second half of the sample, in line with the results of Table 2.

The high correlation between the estimated slope and the excess market return is a further piece of evidence on the importance of the beta factor. However, the association between the two series does not directly address the issue of whether the beta factor is priced, for the results are also consistent with alternative factor models of returns that feature no compensation for beta. One example is a factor model of the form

$$r_{it} - r_{ft} = k + \beta_i [r_{mt} - r_{ft} - E(r_{mt} - r_{ft})] + \varepsilon_{it} ,$$

where E( ) is the expectation operator and ε_{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, ten percent 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 issue arises, however, as to 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 five percent 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.

3. The importance of the beta factor

The noisy, dynamic environment generating stock returns clouds our ability to reach firm conclusions with respect to the pricing of beta. 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 larger risk exposures in terms of return variability than stocks with low betas. 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 stocks' prices. Another possibility is that the relation between past betas and future betas is unstable.

In order to address this issue, table 4 presents the experience of the ten largest "down-market" months (a "down-market" month is a month where $r_m - r_f$ 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 the ten portfolios are nearly monotonically related to their betas. On average, the R^2 is a remarkable 74 percent. October 1987 is still fresh in the memories of many: in that month the excess market return is -22.43 percent, compared to the estimated slope of -22.59 percent. The returns on the ten beta-sorted portfolios are all negative, ranging from -17.10 percent for the portfolio with the lowest beta to -33.76 percent for the portfolio with the highest beta (a difference of 16.66

percent). The R^2 of the cross-sectional regression is 83 percent. The results for the ten largest up-market months in Table 5 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, Table 6 provides averages of the cross-sectional slope coefficients across all "down-market" and all "up-market" months. In the "down-market" sub-sample (panel A), the average excess return on the market is -3.81 percent per month: with this large a "signal," it should become easier to detect whether the beta factor is important. The average slope in this sub-sample is -3.55 percent per month, remarkably close to the average market excess return. Panel B of Table 6 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 realized premium (3.88 percent) and the average slope (3.21 percent).

Note that in both the up-market and down-market sub-samples, the estimated slope is close to the realized market premium in magnitude: the sub-sample slopes are 93 and 83 percent of the market excess return in down- and up-market months, respectively. However, even a small relative difference between the estimated slope and the excess market return in down- or up-market months translates into being off by 29 basis points when pooled over the entire sample (Table 2).

We should stress once more that our strong results in this section for down- and up-market months should not be taken as evidence that <u>on average</u>, 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). However, the estimated slope does not exactly match the excess market return, and so it might be the case that when averaged across all market cycles high-beta stocks do not necessarily earn higher returns than low-beta stocks.

Since we find that the beta factor is important for returns, beta can play a useful role in many investment decisions. A stock's beta would be relevant to a market-timer, an investor tracking a target portfolio or, more generally, any investor who perceives risk in terms of downside exposure. However, while it is important, the beta factor may not necessarily be priced, as we noted in the previous section. Nonetheless, if the compensation for beta risk is less than what is predicted by an equilibrium model, a trading strategy is possible, as Fischer Black (1992) suggests. Such a strategy would involve taking leveraged positions in low-beta stocks, while selling high-beta stocks. This strategy would hence make beta even more interesting. If enough investors follow such a strategy, prices may adjust so that in the future the compensation for beta may be more in line with the predictions of the equilibrium model.

4. 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 paper by Lakonishok, Shleifer and Vishny (1992) 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 his tracking error. His concern with tracking error is not unreasonable, given the very short horizons in the money management industry. Bob 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, since 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 about 2 percent of the equity investment of the top 200 pension funds was indexed to the S&P 500; the number now is close to 20 percent, even without counting the closet indexers. Secondly, 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. We analyse whether the extra demand translates 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 belongs to 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 influences on stock returns when examining the excess return from belonging to the exclusive S&P club.

Table 7 presents the yearly estimates of the coefficient of the dummy variable for S&P membership. Even after controlling all the other influences, we find a sizeable average excess return of 2.19 percent 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 percent) 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 percent (the t-statistic is 3.90).

It is interesting to speculate on how the "S&P index effect" will show up in future stock returns. Given the performance of active money managers, one possibility is that the shift towards indexation will continue. In this case, the 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 whether the stocks in the index are over-priced. Insofar as membership in the index has bestowed an average excess return of 2.19 percent per year for the last fifteen years, one might argue that a correction in prices is due for these stocks.

5. Summary and conclusions

Although the empirical support for beta was never strong, most of us have unquestioningly accepted beta 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 begin searching for better risk measures. This collective data-snooping exercise poses grave dangers and raises the question whether the outcome will be "true" measures of risk.

This paper attempts to evaluate whether we truly have sufficient evidence to dump beta. When we began this research, the case for beta seemed to us pretty tenuous. After finishing the paper, we have by no means become die-hard supporters of beta, but we also don't feel that the evidence for discarding beta is clear-cut and overwhelming.

The inconclusive nature of the results is due to 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 percent.

If we were to plead the case for beta before a jury, we would emphasize the following 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 percent 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 percent 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. A close 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 where 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 ideas on how to form stocks into efficient portfolios.

3. Including other variables may substantially diminish the role of beta 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, returns are perhaps 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 possible confounding influences from institutional or behavioral factors, unrelated to risk.

Footnotes

[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.

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Table 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
Std. Dev.	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

Table 2

Monthly Fama-Macbeth cross-sectional regressions

Sample period	Intercept	Slope	R^2	t-test for slope = r_m-r_f
Jan 32 - Dec 91	0.0059	0.0047	0.48	-1.15
(r_m-r_f = 0.0076)	(3.50)	(1.84)		
Jan 32 - Dec 61	0.0075	0.0074	0.48	-1.01
(r_m-r_f = 0.0115)	(2.80)	(1.82)		
Jan 62 - Dec 91	0.0042	0.0020	0.47	-0.57
(r_m-r_f = 0.0038)	(2.10)	(0.64)		

Table 3

Regression of monthly estimated cross-sectional slope coefficient on excess market return $(r_m - r_f)$

Sample period	Intercept	Slope	R^2	t-test for slope = 1
Jan 32 - Dec 91	-0.0023 (-1.27)	0.9102 (28.09)	0.52	-2.77
Jan 32 - Dec 61	-0.0035 (-1.33)	0.9497 (22.65)	0.59	-1.20
Jan 62 - Dec 91	-0.0012 (-0.49)	0.8398 (15.99)	0.42	-3.05

Table 4

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 (292 months)	-0.0008 (-0.34)	-0.0355 (-13.98)	0.54	-0.0381
Large down months[a] (146 months)	-0.0092 (-2.56)	-0.0524 (-14.19)	0.63	-0.0626
Small down months[b] (146 months)	0.0076 (2.94)	-0.0186 (-6.45)	0.45	-0.0136
	(B) Up-market months			
All up months (428 months)	0.0104 (4.46)	0.0321 (9.62)	0.44	0.0388
Large up months (214 months)	0.0139 (3.49)	0.0530 (9.20)	0.51	0.0625
Small up months (214 months)	0.0069 (2.86)	0.0112 (4.14)	0.37	0.0151

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

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

Table 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	Returns on portfolios formed on beta 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	.93	-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

Table 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

					(Low)			Returns on portfolios formed on beta						(High)
	Month	Market	Slope	R^2	1	2	3	4	5	6	7	8	9	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

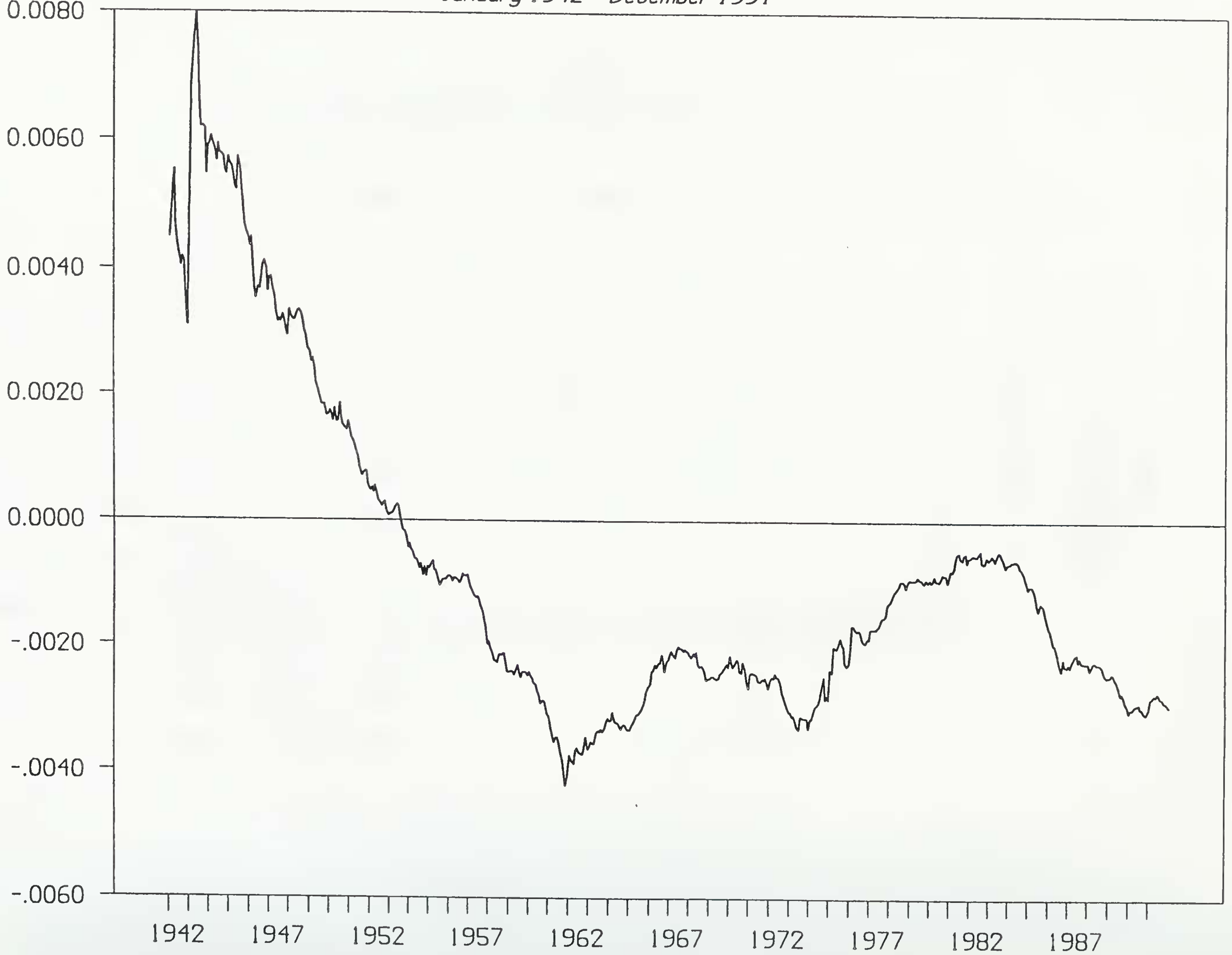
Table 7

The "S&P index effect" on stock returns, 1977-1991

Year	Excess return (%) on S&P500
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

CUMULATIVE AVERAGE DIFFERENCE BETWEEN ESTIMATED SLOPE AND EXCESS MARKET RETURN

January 1942 - December 1991



5-Year Moving Averages of Estimated Slope and Excess Market Return

January 1937 - December 1991