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2 Risk and Return: A New Look

Burton G. Malkiel

One of the best-documented propositions in the field of finance is that, on average, investors have received higher rates of return on investment securities for bearing greater risk. This chapter looks at the historical evidence regarding risk and return, explains the fundamentals of portfolio and asset-pricing theory, and then goes on to take a new look at the relationship between risk and return using some unexplored risk measures that seem to capture quite closely the actual risks being valued in the market.

2.1 Some Historical Evidence

Risk is a most slippery and elusive concept. It is hard for investors—let alone economists—to agree on a precise definition. The dictionary defines risk as the possibility of suffering harm or loss. If I buy one-year Treasury bills to yield, say, 10 percent and hold them until they mature, I am virtually certain of earning a 10 percent monetary return before income taxes. The possibility of loss is so small as to be considered nonexistent. But if I hold common stock in my local power and light company for one year on the basis of an anticipated 12.5 percent dividend return, the possibility of loss increases. The dividend of the company might be cut and, more important, the market price at the end of the year

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could be much lower, so that I might suffer a serious net loss. Risk is the chance that expected security returns will not materialize and, in particular, that the securities I hold will fall in price.

Once academics had accepted the idea that risk for investors is related to the chance of disappointment in achieving expected security returns, a natural measure suggested itself—the probable variability or dispersion of future returns. Thus, financial risk has generally been defined as the variance or standard deviation of returns.[1]

Empirical studies of broad classes of securities confirm the general relationship between risk and return. The most thorough recent study has been done by Ibbotson and Sinquefield (1979). Their data covered the period 1926 through 1978. The results are shown in Table 2.1.

A quick glance shows that, over long periods of time, common stocks have, on average, provided relatively generous total rates of return. These returns, including dividends and capital gains, have exceeded by a substantial margin the returns from long-term corporate bonds and U.S. Treasury bills. The stock returns have also tended to be well in excess of the inflation rate as measured by the annual rate of increase in consumer prices. The data show, however, that common stock returns are highly variable as measured by the standard deviation and the range of annual returns shown in the last three columns of the table. Returns from equities have ranged from a gain of over 50 percent (in 1933) to a loss of almost the same magnitude (in 1931). Clearly, the extra returns that have been available to investors from stocks have come at the expense of assuming considerably higher risk.

The patterns evident in Ibbotson and Sinquefield's chart also appear when the returns and risks of individual stock portfolios are compared. Indeed, most of the differences that exist in the returns from different mutual funds can be explained by differences in the risk they have assumed. However, there are ways in which investors can reduce the risks they take. This brings us to the subject of modern portfolio theory.

2.2 Reducing Risk: Modern Portfolio Theory

Portfolio theory begins with the premise that all investors are risk averse. They want high returns and guaranteed outcomes. The theory tells investors how to combine stocks in their portfolios to give them the least risk possible, consistent with the return they seek. It also gives a rigorous mathematical justification for the time-honored investment

1. Variance is defined as the average squared deviation of the (periodic) investment returns from their average. The square root of the variance is the standard deviation and is also often used to measure variability and, thus, risk. While it is true that only downward surprises constitute risk, as long as the distribution of returns is symmetric, a variance measure will serve as a good proxy for the chance of disappointment.

Table 2.1 **Selected Performance Statistics, 1926–78**

	Annual (Geometric) Mean Rate of Return	Number of Years Returns Are Positive	Number of Years Returns Are Negative	Highest Annual Return (and Year)	Lowest Annual Return (and Year)	Standard Deviation of Annual Returns
Common Stocks	8.9	35	18	54.0% (1933)	−43.3 (1931)	22.4
Long-term corporate bonds	4.0	43	10	18.4 (1970)	−8.1 (1969)	5.8
U.S. Treasury bills	2.5	52	1	8.0 (1974)	−0.0 (1940)	2.1
Consumer Price Index	2.5	43	10	18.2 (1946)	−10.3 (1932)	4.7

SOURCE: Ibbotson and Sinquefield (1979).

maxim that diversification is a sensible strategy for individuals who like to reduce their risks. The basic idea was that a portfolio of risky (volatile) stocks can be put together in such a way as to be less risky than any one of the individual stocks in it. A simple illustration will make the whole game clear.

Let us suppose we have an island economy with only two businesses. The first is a large resort with beaches, tennis courts, a golf course, and the like. The second is a manufacturer of umbrellas. Weather affects the fortunes of both. During sunny seasons the resort does a booming business and umbrella sales plummet. During rainy seasons the resort owner does very poorly, while the umbrella manufacturer enjoys high sales and large profits. Table 2.2 shows some hypothetical earnings for the two businesses during the different seasons. I assume that all earnings are paid out as dividends, so these are also the returns paid out to investors.

Suppose that, on average, one-half the seasons are sunny and one-half are rainy (i.e., the probability of a sunny or rainy season is one-half). An investor who bought stock in the umbrella manufacturer would find that half the time he earned a 50 percent return and half the time he lost 25 percent of his investment. On average, he would earn a return of 12.5 percent. This is what we call the investor's *expected return*. Similarly, investment in the resort would produce the same results. Investing in either one of these businesses would be fairly risky, however, because the results are quite variable, and there could be several sunny or rainy seasons in a row.

Suppose, however, that instead of buying only one security an investor with two dollars diversified and put half his money in the umbrella manufacturer's and half in the resort owner's business. In sunny seasons, a one-dollar investment in the resort would produce a fifty-cent return, while a one-dollar investment in the umbrella manufacturer would lose twenty-five cents. The investor's total return would be twenty-five cents, which is 12.5 percent of his total investment of two dollars.

Note that during rainy seasons exactly the same thing happens—only the names are changed. Investment in the umbrella manufacturer produces a good 50 percent return while the investment in the resort loses 25 percent. Again, however, the diversized investor makes a 12.5 percent return on his total investment.

This simple illustration points out the basic advantage of diversification. Whatever happens to the weather, and thus to the island economy, by diversifying investments over both of the firms an investor is sure of

Table 2.2 An Example of Diversification

	Umbrella Manufacturer	Resort Owner
Rainy season	50%	−25%
Sunny season	−25%	50%

making a 12.5 percent return each year. The trick that made the game work was that while both companies were risky (returns were variable from year to year), the companies were affected differently by weather conditions. As long as there is some lack of parallelism in the fortunes of the individual companies in the economy, diversification will always reduce risk. In the present case, where there is a perfect negative relationship between the companies' fortunes (one always does well when the other does poorly), diversification can totally eliminate risk.

Of course, there is always a rub, and the rub in this case is that the fortunes of most companies move pretty much in tandem. When there is a recession and people are unemployed, they may buy neither summer vacations nor umbrellas. Therefore, one should not expect in practice to get the neat total risk elimination just shown. Nevertheless, since company fortunes do not always move completely in parallel, investment in a diversified portfolio of stocks is likely to be less risky than investment in one or two single securities. While a portfolio of General Motors and its major steel and tire supplier would not reduce risk much, if at all, a portfolio of GM and a defense contractor in a depressed area might reduce risk substantially.

The example may seem a bit strained, and most investors will realize that when the market gets clobbered just about all stocks go down. Still, at least at certain times, some stocks do move against the market. Gold stocks are often given as an example of securities that do not typically move in the same direction as the general market. Similarly, international diversification can reduce risk. The point to realize in setting up a portfolio is that true diversification of a portfolio depends on having stocks that are not all dependent on the same economic variables (total spending in the economy, inflation rates, etc.). Wise investors will diversify their portfolios not by names or industries but by the determinants that influence the fluctuations of various securities.

2.3 Modeling Risk: The Capital-Asset Pricing Model (CAPM)

Portfolio theory has important implications for how stocks are actually valued. If investors seek to reduce risk in anything like the manner described by portfolio theorists, the stock market will tend to reflect these risk-reducing activities. This brings us to what is called the "Capital-Asset Pricing Model."

I have mentioned that the reason diversification cannot usually produce the miracle of risk elimination is that usually stocks tend to move up and down together. Still, diversification is worthwhile—it can eliminate some risks. What the CAPM did was to focus directly on what part of a security's risk could be eliminated by diversification and what part could not.

The theory begins by classifying the sources of the variability of an individual stock. Part of total risk or variability may be called the security's *systematic risk*, arising from the basic variability of stock prices in general and the tendency for all stocks to go along with the general market, at least to some extent. The remaining variability in a stock's returns is called *unsystematic risk* and results from factors peculiar to that particular company, for example, a strike, the discovery of a new product, and so on.

Systematic risk, also called market risk, captures the reaction of individual stocks (or portfolios) to general market swings. Some stocks and portfolios tend to be very sensitive to market movements. Others are more stable. This relative volatility or sensitivity to market moves can be estimated on the basis of the past record, and is popularly known as the beta calculation. This calculation is essentially a comparison between the movements of an individual stock (or portfolio) and the movements of the market as a whole. It is a numerical description of systematic risk.

The calculation begins by assigning a beta of 1 to a broad market index, such as the NYSE index or the S&P 500. If a stock has a beta of 2, then on average it swings twice as far as the market. If the market goes up 10 percent, the stock rises 20 percent. If a stock has a beta of 0.5, it tends to be more stable than the market (it will go up or down 5 percent when the market rises or declines 10 percent). Professionals often call high-beta stocks aggressive investments and label low-beta stocks as defensive.

Now the important thing to realize is that *systematic risk cannot be eliminated by diversification*. It is precisely because all stocks move more or less in tandem (a large share of their variability is systematic) that even diversified stock portfolios are risky. Indeed, if I diversified extremely broadly by buying a share in the S&P index (which by definition has a beta of 1), I would still have quite variable (risky) returns because the market as a whole fluctuates widely.

Unsystematic risk is the variability in stock prices (and, therefore, in returns from stocks) that results from factors peculiar to an individual company. Receipt of a large new contract, discovery of mineral resources on the company's property, labor difficulties, the revelation that the corporation's treasurer has had his hand in the company till—all can make a stock's price move independently of the market. The risk associated with such variability is precisely the kind that diversification can reduce. The whole point of portfolio theory was that, to the extent that stocks do not move in tandem all the time, variations in the returns from any one security will tend to be washed away or smoothed out by complementary variation in the returns from other securities.

Figure 2.1 illustrates the important relationship between diversification and total risk. Suppose we randomly selected securities for our portfolio that tended on average to be just as volatile as the market. (The average betas for the securities in our portfolio will always be equal to 1.)

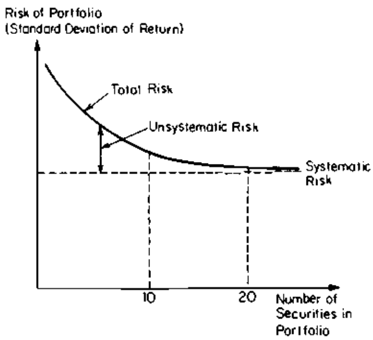

Fig. 2.1 How Diversification Reduces Risk. From Franco Modigliani and Gerald A. Pogue, "An Introduction to Risk and Return," *The Financial Analyst Journal*, March–April 1974.

Figure 2.1 shows that as we add more securities, the total risk of our portfolio declines, especially at the start.

When ten securities are selected for our portfolio, a good deal of the unsystematic risk is eliminated, and additional diversification yields little further risk reduction. By the time twenty securities are in the portfolio, the unsystematic part of risk is substantially eliminated, and our portfolio (with a beta of 1) will tend to move up and down essentially in tandem with the market.

Now comes the key step in the argument. Both financial theorists and practitioners had agreed for years that investors should be compensated for taking on more risk by receiving a higher expected return. Stock prices must therefore adjust to offer higher returns where more risk is perceived, to ensure that all securities are held by someone. What is different about the new theory is the definition and measurement of risk. Before the advent of the CAPM, it was often suggested that the return on each security would be related to the total risk inherent in that security. It was believed that the return from holding a security would vary with the instability of that security's particular performance, that is, with the variability or standard deviation of the returns it produced. The new theory says that the *total* risk of each individual security is irrelevant. Only the systematic component of that total instability is relevant for valuation. Because stocks can be combined in portfolios to eliminate specific risk (see Figure 2.1), only the undiversifiable or systematic part of the risk will command a risk premium (i.e., an extra return over and above that obtainable from a riskless asset). Investors will not get paid for bearing risks that can be diversified away. The only part of total risk that investors will get paid for bearing is systematic risk, the risk that diversification cannot eliminate. This is the basic logic behind the CAPM.

If investors did get an extra return (a risk premium) for bearing unsystematic risk, diversified portfolios made up of stocks with large

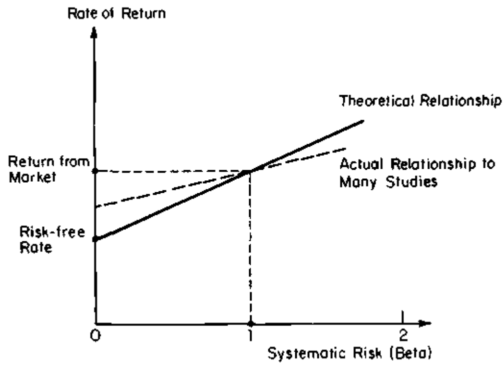

Fig. 2.2 Risk and Return According to the Capital-Asset Pricing Model. Rate of return = risk-free rate + beta × (return from market − risk-free rate). In other words, the return you get on any stock or portfolio increases directly with the beta value you assume. From *A Random Walk down Wall Street,* 2d college ed. © 1981 by Burton G. Malkiel. Used with permission of the publishers, W. W. Norton & Company, Inc.

amounts of unsystematic risk would give larger returns than equally risky portfolios of stocks with less unsystematic risk. Investors would snap at these higher returns by bidding up the prices of stocks with large unsystematic risk and selling stocks with equivalent betas but lower unsystematic risk. This would continue until the prospective returns of stocks with the same betas were equalized and no risk premium could be obtained for bearing unsystematic risk. Thus, the CAPM says that returns for any stock (or portfolio) will be related to beta, the systematic risk that cannot be diversified away. Any other results would be inconsistent with the existence of efficient markets.

The key relationship of the theory is shown in Figure 2.2 (For the moment, ignore the dashed line in the diagram.) As the systematic risk (beta) of an individual stock (or portfolio) increases, so does the return an investor should expect. If an investor's portfolio has a beta of zero, as might be the case if all his funds were invested in a very short-term Treasury bill (beta would be zero since the returns from the certificate would not vary at all with swings in the stock market), the investor would receive some modest rate of return, which is generally called the risk-free rate of interest.[2] As the individual takes on more risk, however, the return should increase. If the investor holds a portfolio with a beta of 1 (for example, one share in one of the broad stock market averages), his return will equal the general return from common stocks. This return has over long periods of time exceeded the risk-free rate of interest, but the investment is a risky one. In certain periods the return is much less than

2. Of course, the yield from a Treasury bill is risk free only in a nominal sense. An investor will be guaranteed a certain money rate of return from the investment but his/her real rate of return will be uncertain. The risk-return relationships described here concern relationships between nominal returns before inflation and before taxes.

the risk-free rate and involves taking substantial losses. This, as we have said, is precisely what is meant by risk.

Figure 2.2 shows that a number of different expected returns are possible simply by adjusting the beta of the portfolio. For example, suppose an investor put half of her money in a T-bill and half in a share of the market averages. In this case she would receive a return midway between the risk-free return and the return from the market, and her portfolio would have an average beta of 0.5. The theory then asserts very simply that to get a higher average long-run rate of return, one must simply increase the beta of the portfolio. An investor can get a portfolio with a beta larger than 1 either by buying high-beta stocks or by purchasing a portfolio with average volatility on margin.

2.4 Tests of the CAPM Model

Tests of the CAPM have tried to ascertain if security returns are in fact directly related to beta, as the theory asserts. The early evidence seemed to support the theory. The relationship between the performance of a large number of professionally managed funds and the beta measure of relative volatility was generally consistent with the theory. The portfolio returns have varied positively with beta in roughly a straight-line manner, as is shown in Figure 2.3, so that over the long pull, high-beta portfolios have provided larger total returns than low-risk ones.

Unfortunately, however, as more evidence accumulated, a number of disquieting results came to light. First, the measured actual risk-return

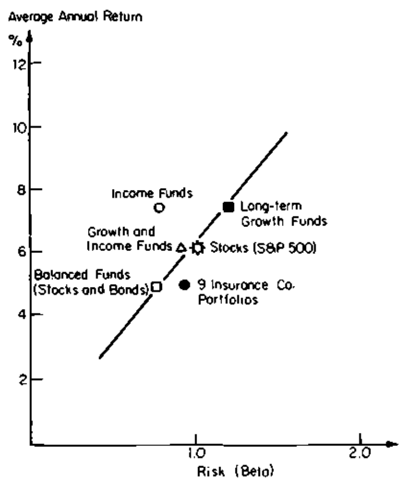

Fig. 2.3 Average Annual Return versus Risk: Selected Institutional Investors, 1965–78. Source: Buck Consultants, Inc. From *The Inflation Beater's Investment Guide: Winning Strategies for the 1980s*. © 1980 by Burton G. Malkiel. Used with permission of the publishers, W. W. Norton & Company, Inc.

relationships found in the market appear to be much flatter than those implied by the theory. In Figure 2.2, for example, the actual measured relationships have usually looked more like the dashed line than the solid line, which represents the theoretical relationship. There seems to be a phenomenon much like that found at the racetrack, in that low-risk stocks earn higher returns and high-risk stocks earn lower returns than the theory predicts. (At the racetrack, long shots seem to go off at much lower odds than their true probability of winning would indicate, whereas favorites go off at higher odds than is consistent with their winning percentages.)

The divergence of theory from evidence is even more striking in the short run. For some short periods, it may happen that risk and return are *negatively* related. In 1972, for example, which was an up-market year, it turned out that safer (lower-beta) stocks went up more than did *more* volatile securities. *Fortune* magazine commented dryly on this well-publicized failure: "The results defied the textbooks." What happened was that in 1972, styles changed in Wall Street, as institutional investors eschewed younger, more speculative companies, the "faded ladies" of the late 1960s, and became much more enamored of the highest quality, most stable leading corporations in the so-called first tier of stocks. It became clear that beta could not be used to guarantee investors a predictable performance over periods of a few months or even a year. And even over some longer periods of time—when the market has produced a positive rate of return—investors have actually been penalized for taking on more risk.

Another problem the theory encounters is the instability of measured betas. The beta of a stock is measured on the basis of historical relationships between returns for that stock and the returns from the market. It turns out that these past betas for individual stocks are relatively poor predictors of future betas. While the problem is less severe for portfolios, which are averages of many stocks, it is clear that past betas are quite imperfect estimates of future volatility numbers. Moreover, as Roll (1977) has pointed out, it is impossible to observe the market's return against which we measure beta. In principle, the market includes *all* stocks, a variety of other financial instruments, and even nonmarketable assets. The Standard and Poor's Index (or any other index) is a very imperfect market proxy at best. And, when we measure "market risk" using imperfect proxies, we may obtain quite imperfect estimates of market sensitivity. Roll (1977) showed that by changing the market index against which betas are measured, one can obtain quite different measures of the risk level of individual stocks or portfolios and thus quite different predictions of future returns. It is clear, then, that in judging risk, beta cannot be a substitute for brains.

2.5 Toward a Broader Method of Risk Measurement

To understand the logic of the risk measurement system proposed here, it is important to remember the correct insight underlying the CAPM. The only risk that investors should be compensated for bearing is the risk that cannot be diversified away. Only systematic risk will command a risk premium in the market. But, the systematic elements of risk in particular stocks and portfolios may be far more complicated than can be captured by a beta measure—the tendency of stocks to move more or less than any particular stock index.

Let us take a look at several other potential systematic risk elements. Changes in National Income, for example, may affect returns from individual stocks in a systematic way. This was mentioned earlier in the illustration of a simple island economy. During a recession, consumers might buy neither vacations nor umbrellas. Changes in National Income also mirror the changes in the personal income available to individuals, and so the systematic relationship between security returns and salary income can be expected to be important elements in individual behavior. For example, the worker in a Ford plant will find that a holding of Ford common stock is particularly risky since job layoffs and poor returns from Ford stock are likely to occur at the same time. Changes in National Income may also reflect changes in other forms of property income and may therefore be relevant for institutional portfolio managers as well.

Changes in interest rates also systematically affect the returns from individual stocks and are important nondiversifiable risk elements. To the extent that stocks tend to suffer as interest rates go up, equities are a risky investment, and those stocks that are particularly vulnerable to increases in the general level of interest rates are especially risky. Since fixed-income securities are included in the portfolios of many institutional investors, this systematic risk factor is particularly important for some of the largest investors in the market. Clearly, then, investors who think of risk in its broadest and most meaningful sense will be sensitive to the tendency of stocks to be affected by changes in interest rates.

Changes in the rate of inflation will similarly tend to have systematic influences on the returns from common stocks. This is so for at least two reasons. First, an increase in the rate of inflation tends to increase interest rates and thus may lead to the lower prices of equities just discussed. Second, increases in inflation may squeeze profit margins for certain groups of companies such as public utilities, which often find that rate increases lag behind increases in their costs. On the other hand, inflation may benefit the prices of some common stocks, such as those in natural resource industries. Thus, again there are important systematic relationships between stock returns and economic variables that may not be captured adequately by a simple beta measure of risk.

The final new risk variable introduced is a measure of the dispersion among Wall Street security analysts concerning the future earnings and dividend growth of the company. If analysts differ greatly in their growth forecasts for a company, we shall consider the stock to be relatively risky. At first glance, this forecast dispersion variable may seem like a measure of total variability for a company—precisely the kind of measure that was used before the advent of the Capital-Asset Pricing Model. While such an interpretation is possible, the dispersion of analysts' forecasts may actually serve as a particularly useful proxy for a variety of systematic risks. The following illustration will explain why.

Suppose we had two companies, one a steel company that is extremely sensitive to systematic influences in the economy, the other a pharmaceutical firm that is quite insensitive to economic conditions. It may be that Wall Street analysts agree completely on how economic conditions will affect the two companies, but still differ greatly on their economic forecasts. If this were so, there could be a big dispersion in earnings forecasts for the steel company (because of the differences in economic forecasts and the sensitivity of the company to economic conditions), and very small differences in forecasts in the drug company (because economic conditions have little effect on that company).

Table 2.3 illustrates the situation. Analyst 1 is optimistic about real growth and convinced that inflation and interest rates will fall. Analyst 2 predicts sluggish real growth but believes that inflation and interest rates will remain high. The analysts may agree completely on how economic conditions affect the two companies. Nevertheless, they can differ in their earnings forecasts, because their economic forecasts differ and the two companies are not equally sensitive to these economic conditions. The steel company is very sensitive to GNP growth because it affects sales, to inflation because it affects raw material prices, and to interest rates because they affect borrowing costs. Thus, analyst 1 sees strong earnings growth for the steel company while analyst 2 predicts a very weak performance. As for the drug company, since, by assumption, it is relatively unaffected by economic conditions, the analysts agree on their earnings forecasts despite differences in their economic forecasts. The important point to note about this illustration is that the company for which the forecasts differed was the company most sensitive to systematic risk factors, i.e., the company with the greatest systematic sensitivity to economic conditions. Hence, differences in analysts' forecasts may be a most useful proxy for systematic risk in the broadest sense of the term.

2.6 Some Statistical Tests

It is possible to test statistically the influence of variable risk factors on anticipated rates of return for different common stocks. We hypothesize

Table 2.3 How Economic Forecasts Affect Earnings Forecasts

	Economic Forecast	Steel Company Forecast	Drug Company Forecast
Analyst 1	GNP: up sharply Inflation: down Interest rates: down	Sales up Raw material prices steady Borrowing costs down	Sales up whatever happens to GNP Uses few raw materials—no effect No borrowing—no effect
		Strong earnings growth	Strong earnings growth
Analyst 2	GNP: no growth Inflation: remains high Interest rates: remain high	Sales flat Raw material prices up Borrowing costs up	Sales up whatever happens to GNP Uses few raw materials—no effect No borrowing—no effect
		Weak earnings growth	Strong earnings growth

that stocks with larger systematic risks ought to promise investors a higher expected rate of return—the bigger the risk, the larger should be the reward.[3] Several alternative measures of systematic risk were used in the analysis.

1. Market Risk: Market risk is measured by beta, the historical sensitivity of the stock to swings in the overall market index. Stocks very sensitive to fluctuations in the overall market are riskier and therefore should provide higher anticipated rates of return.

2. Economic Activity Risk: This risk measures the sensitivity of an individual stock to movements in the level of National Income. It is estimated on the basis of past sensitivity of a security's return to changes in National Income. Stocks that are more sensitive to fluctuations in economic activity will have more systematic risk and hence ought to offer a larger rate of return.

3. Inflation Risk: Stocks which tend systematically to produce very poor returns when inflation accelerates are considered to have large systematic risk with respect to inflation. Hence, stocks with greater inflation risk should offer a higher anticipated rate of return.

4. Interest Rate Risk: Stocks which are extremely sensitive to interest rates also contain greater systematic risk. Alternatively, stocks that do well when interest rates rise would be particularly valuable in portfolios which contain both stocks and bonds. Thus, stocks that are particularly sensitive to change in market interest rates should be considered riskier and hence command a larger prospective rate of return.

5. Dispersion of Analysts' Forecasts: As indicated above, this risk variable may serve as a good proxy for a variety of systematic risk. The larger the dispersion of forecasts, the larger the anticipated return ought to be to the holder of securities.

The hypothesis to be tested is that expected returns on individual stocks should be related to a variety of risk variables. In order to perform the test, however, we need some way of measuring expected returns on individual stocks. We also need expectational data on the forecasts of security analysts from which we can measure the forecast dispersion mentioned above. Fortunately, a long-standing study done at Princeton's Financial Research Center has provided the expectational data we need. For each year during the 1960s, data were collected from a number of leading investment houses on forecasts of the long-run growth of dividends and earnings for a substantial sample of investment-grade issues. We also obtained similar data for the end of 1980 from the Institutional Brokerage Estimate System (IBES) of the investment firm of Lynch, Jones, and Ryan. The IBES provided estimates of long-run earnings growth as well as the dispersion of forecasts.

3. A formal theoretical justification for the hypothesis tested can be found in Malkiel and Cragg (1980). See also Ross (1976).

Anticipated rates of return on individual common stocks were derived from the standard dividend discount valuation model. According to that model the worth of a common stock is equal to the present value of the future stream of dividends an investor can expect to receive from that stock. It turns out that this model has a very simple implication. The expected rate of return on any stock can be derived by summing the dividend yield of the stock and the long-run expected growth rate of the earnings and dividends per share. An example will make the calculations clear. Say that American Telephone and Telegraph is selling at a dividend yield of approximately 10.5 percent. Say the average Wall Street forecast for the long-run expected growth rate of dividends is 6 percent. It will then turn out that a long-run holder of AT&T common stock can expect a 16.5 percent rate of return from holding AT&T stock. This is made up of a 10.5 percent dividend yield plus a 6 percent growth rate.[4]

We have now discussed the measurement of all the variables used in the study as well as the hypothesis to be tested. We turn next to the results of the analysis. Table 2.4 shows the statistical relationship between expected rates of return for a sample of individual stocks and the five risk measures listed above. While the pairwise correlation coefficients are not terribly high they are statistically significant in most instances. Thus, the results indicate that each of these risk variables does seem to be important in explaining the structure of anticipated returns. The t-statistics also support this conclusion. A handy rough rule is that any t-statistic larger than 2 indicates a statistically significant relationship.

While the traditional beta measure of risk does seem to be related to expected returns in the manner described by the theory, it appears that there are a variety of systematic risk influences on individual stocks and portfolios. Systematic susceptibility to economic conditions as measured by National Income, interest rates, and the rate of inflation also seems to play an important role in explaining differences in expected returns. This can be seen by looking at the correlation coefficients relating each risk measure to expected returns and by examining the t-values. The fact that so many of the t-values are statistically significant in the table suggests that several systematic risk influences clearly influence expected returns. Moreover, when several of these systematic risk influences are used together, a far better explanation of differences in expected returns is

4. If we assume that the price-earnings multiple and dividend yield do not change, even a short-run holder can expect the same 16.5 percent rate of return. This is so because by assumption the stock's value will grow at 6.0 percent because of the increase in dividends and earnings. Hence, an individual selling AT&T stock after a year would realize 6.0 percent appreciation as well as a 10.5 percent dividend return. Although the results are not reported here, anticipated rates of return were also derived from a somewhat different version of the standard valuation model that allowed for variable long-term growth rates. The results were quite similar to those obtained from the simple model, and only the results from the standard model are reported here.

Table 2.4 **Association of Risk Measures and Expected Returns (Correlation Coefficients and T-Values of Regression Coefficients)**

	Market Risk (Beta)		Economy Risk		Inflation Risk		Interest Rate Risk		Dispersion of Analysis Forecasts	
	Corr. Coef.	T-Value	Corr. Coef.	T-Value	Corr. Coef.	T-Value	Corr. Coef.	T-Value	Corr. Coef,	T-Value
1961	.32	3.65	.32	3.98	.11	1.31	.03	0.36	.25	2.57
1962	.26	3.32	.29	3.84	.08	1.03	.07	0.93	.44	6.30
1963	.04	0.55	.21	2.70	.10	1.29	.10	1.22	.28	3.74
1964	.13	1.65	.22	2.87	.18	2.24	.22	2.89	.42	5.95
1965	.29	3.79	.26	3.42	.24	3.17	.25	3.31	.47	6.97
1966	.39	5.35	.25	3.27	.40	5.40	.37	4.90	.22	2.79
1967	.31	3.49	.30	3.85	.47	6.59	.43	5.74	.20	2.54
1968	.27	3.35	.32	3.91	.49	6.50	.39	4.97	.74	12.86
1980	.27	4.56	.21	3.24	.16	2.56	.05	0.78	.31	5.29

Table 2.5 Multiple Correlation Coefficients Using All Five Risk Variables Together

Year	Multiple Correlation Coefficient
1961	.44
1962	.49
1963	.37
1964	.52
1965	.48
1966	.45
1967	.54
1968	.80
1980	.38

found than can be obtained using any single measure alone. This can be seen by comparing the multiple correlation coefficients in Table 2.5 with the single-variable correlations shown in Table 2.4.[5] Although this is not shown in the table, it should be noted that several of the risk variables were statistically significant in each year. This indicates that several systematic risk elements influence expected security returns.

If, however, we wanted for simplicity to select the one risk measure that is most closely related to expected returns, the traditional beta measure would probably not be our first choice. The best single risk proxy appears to be the dispersion of analysts' forecasts. This risk measure generally produced the highest correlations with expected returns and the highest t-values in Table 2.4. Companies for which there is a broad consensus with respect to future earnings and dividends seem to be less risky (and hence have lower expected returns) than companies for which there is little agreement among security analysts. It is possible to interpret this result as contradicting modern asset-pricing theory, which suggests that total variability per se will not be relevant for valuation. As we have shown, however, this dispersion of forecasts could well result if different companies were particularly susceptible to systematic risk elements, and thus our dispersion measure may be the best individual proxy available to capture the variety of systematic risk elements to which securities are subject.

2.7 Implications of the Analysis

The quest for better risk measures is not simply an amusing exercise that accomplishes only the satisfaction of permitting academics to play

5. In general, the correlations are not as close for 1980. 1980 used a different data set and is therefore not directly comparable. The general findings for 1980 are similar, however.

with their computers. It has important implications for protecting investors. A good illustration of how a better understanding of the many facets of risk can aid investors is provided by the recent fascination with so-called yield-tilted index funds, which had gained a considerable following in the investment community by the 1980s. Yield-tilted index funds tried to match closely the general composition of one of the broad stock indices such as the S&P 500 stock index, but their portfolios were tilted toward relatively high yield stocks. Such funds were being especially recommended for tax-exempt investors.

The reasoning behind the yield-tilted index fund seemed appealingly plausible. Since dividends are generally taxed more highly than capital gains, and since the market equilibrium is presumably achieved on the basis of after-tax returns, the equilibrium pretax returns for stocks that pay high dividends ought to be higher than for securities which produce lower dividends and correspondingly higher capital gains. Hence, the tax-exempt investor should specialize in buying high-dividend-paying stocks. In order to avoid the assumption of any greater risk than is involved in buying the market index, however, this tax-exempt investor was advised to purchase a yield-tilted *index* fund, that is, a very broadly diversified portfolio of high-dividend paying stocks that mirrored the market index in the sense that it had a beta coefficient precisely equal to one.

Even on a priori grounds one might question the logic of the yield-tilted index fund. Many of the largest investors in the market are tax-exempt (such as pension and endowment funds), and other investors (such as corporations) actually pay a higher tax on capital gains than on dividend income.[6] Thus, it is far from clear that many of the most important investors in the stock market prefer to receive income through capital gains rather than through dividend payments. But apart from these a priori arguments, the statistical results just reviewed can be interpreted as providing another argument against the yield-tilted index fund.

If the traditional beta calculation does not provide a full description of systematic risk, the yield-tilted index fund may well fail to mirror the market index. Specifically, during periods when inflation and interest rates rise, high-dividend stocks may be particularly vulnerable. Public utility common stocks are a good example. Although they are known as low-beta stocks, they are likely to have high systematic risk with respect to interest rates and inflation. This is so not only because they are good substitutes for fixed-income securities, but also because public utilities are vulnerable to a profits squeeze during periods of rising inflation because of regulatory lags and increased borrowing costs. Hence, the

6. For corporate investors, 85 percent of dividend income is excluded from taxable income while capital gains are taxed at normal gains rates.

yield-tilted index fund with beta equal to one may not mirror the market index when inflation accelerates.

The actual experience of yield-tilted index funds during the 1979–80 period was far from reassuring. The performance of these funds was significantly worse than that of the market. Of course, we should not reject a model simply because of its failure over any specific short-term period. Nevertheless, I believe that an understanding of the wider aspects of systematic risk, such as provided here, would have helped prevent what turned out to be (at least over the short term) some serious investment errors.

Conclusion

I have argued here that no single measure is likely to capture adequately the variety of systematic risk influences on individual stocks and portfolios. Returns are sensitive to general market swings, to changes in interest rates and in the rate of inflation, to changes in National Income and, undoubtedly, to other economic factors as well. Moreover, if one were to select the best individual risk estimate, the traditional beta measure would probably not be our first choice. The dispersion of analysts' forecasts seems to have a closer relationship with expected returns and may be the best single measure of systematic risk available.

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