Dividend yields are equity risk premiums*

"Can dividend yields be used to time purchases and sales in the stock market? The evidence dictates an affirmative answer."

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This paper discusses three separate, interrelated topics: equity risk premiums, random walks, and the bond-stock yield spread. The common thread uniting these three topics is the dividend yield on common stocks. I present here a case for using dividend yields to measure ex ante equity risk premiums.[1] Further, I provide evidence that stock market returns are not a random walk and that the current dividend yield provides a clue to future return predictability.[2] Finally, I give a new interpretation of the bond-stock yield spread, which employs the idea that dividend yields are measures of equity risk premiums.[3]

DEFINITIONS

I will be discussing familiar financial constructs throughout the paper. To keep us on the same wavelength, please note the following definitions:

RSTK = expected rate of return (capital gains plus dividend yield) of the stock market;

RBILL = expected rate of return on Treasury bills;

RGOVT = expected rate of return on long-term government bonds, and

RCORP = expected rate of return on long-term corporate bonds.

Think of the return on the stock market as being built up from component elements according to the following identity:

$$\text{RSTK} \equiv \text{RBILL} + (\text{RGOVT} - \text{RBILL}) + (\text{RCORP} - \text{RGOVT}) + (\text{RSTK} - \text{RCORP}). \qquad (1)$$

Viewed in this way, the return on common stock is the return on a T-bill plus three risk premiums: (1) a maturity premium of long-term over short-term governments (RGOVT − RBILL), which we call RP1; (2) a default risk premium of long-term corporate bonds over long-term governments (RCORP − RGOVT), which we call RP2, and (3) an equity risk premium of stocks over corporate bonds (RSTK − RCORP), which we call RP3.[4]

Since many people speak of the risk premium of stocks over T-bills and refer to it simply as the "equity risk premium," let me define this, too. The equity risk premium consists of RP1 + RP2 + RP3; I will call this sum RPE. Henceforth, I use the terms equity risk premium and RPE interchangeably.

Finally, recall that RBILL can itself be decomposed into two components, namely, the expected real return (RR) and the expected rate of inflation (INF). Hence, another way of expressing RSTK is:

$$\text{RSTK} = \text{RR} + \text{INF} + \text{RPE}. \qquad (2)$$

IMPORTANCE OF EQUITY RISK PREMIUM

With these definitions before us, let us discuss the equity risk premium RPE. If we knew this number, it would tell us on an ex ante basis how much additional return investors are demanding as a reward for taking on the additional risk of common stock ownership. When we buy a pizza, we know its price, and we have a definite idea of the (nonmone-

* I appreciate the stimulating comments and suggestions of Peter L. Bernstein.

1. Footnotes appear at the end of the article.

tary) returns it provides. When we buy a stock, we know its price, but we do not know what anticipated returns are being priced into the stock. That is where the equity risk premium comes in. An estimate of its value offers us a clue to the relative merits of investing in stocks versus the less risky medium of Treasury bills.

Suppose we estimate that RPE on an ex ante basis is relatively large at 10%, indicating a relatively great market aversion to stocks. If we are less risk-averse than the general market, we may consider stock purchases at such a time. Suppose we estimate that RPE is relatively low at 2%; then the reward for taking on stock market risk is low. If we personally demand higher risk premiums, we may decide to avoid stocks in this instance.

Clearly, then, intelligent investing calls for some hint of how much of a risk premium the market is currently demanding. The operative word here is *current*. It does us little good to know that RPE was 8% in 1932 and 4.2% in 1976. The critical question is: "What is the equity risk premium now?"

A vital component of the equity risk premium is unknown — namely, the *anticipated* stock market return. Hence, we never really know ex ante what RPE is or how it is changing. At best we estimate its size and direction of movement. Three of the many methods for estimating risk premiums are especially popular: the method of realized or ex post market rates of return, the use of the Gordon-Shapiro constant growth model, and the use of spreads between different classes of bonds. I will give a new twist to the constant growth model, suggesting to you that it is helpful to look at the dividend yield on stocks as an approximation of the equity risk premium. First, however, let me briefly discuss these three methods of measuring RPE.

REALIZED RETURN METHOD

Ibbotson and Sinquefield [1982] are protagonists of the realized return method of measuring equity risk premiums. The realized return method replaces the unobservable risk premium by an average of its realizations over past time periods, where a realization is defined as the *actual* market return less the actual Treasury bill return. Because the market return fluctuates greatly from year to year, the realized risk premium fluctuates dramatically from period to period. Hence, any single realized risk premium is undoubtedly a noisy measure of that which was anticipated. To overcome this deficiency, Ibbotson and Sinquefield average the realized risk premiums over a sample of 56 years, obtaining an arithmetic mean of 8.3% for the time period 1926-1981.[5] The justification for averaging is their *assumption* [1982, p. 75] "that both the supply and demand equilibrium price for risk capital and the amount of risk in common stocks will not change over time." It follows that their estimate of the *current* (1983, as this article is written) risk premium is just 8.3% — in other words, the average realized equity risk premium that they have measured historically.

The realized risk premium method's purported major virtue, its use of actual market data and actual market risk premiums, is actually its major defect. These data seemingly provide a tie to reality, but we are required to assume a stationary risk premium distribution through time. This assumption introduces data that may well be irrelevant to today's market situation. Rather than attempting to measure the current RPE based on *current* conditions, the realized return method brazenly assumes that conditions are such that RPE always has the same average value.

Proponents of the realized return method argue that the time series of realized equity risk premiums comes from a stationary distribution and that this statistical property justifies the averaging over long time periods. If realized equity risk premiums seem stationary in a *statistical* sense, it is only because current statistical methods are too weak to detect a shift in ex ante expected equity risk premiums as time passes. Must it follow that blind averaging is the only or even the best method of measuring today's expected RPE? I think not. I will present a measure of RPE that is soundly based in economic theory and that also provides predictions of realized risk premiums that are at least as accurate as those provided by the realized risk return method (see Table 1 below).

TABLE 1

Prediction errors of realized return and dividend yield methods, 1962-1982, in predicting realized equity risk premiums.

Predictor	Mean Error[a]	Mean Absolute Error[b]	Mean Square Error[c]
Realized return method	-.0760	.1378	.0317
Dividend yield method	-.0181	.1334	.0249

[a]Defined as arithmetic mean over 21 annual observations of $(A-F_i)$ where where A = actual risk premium and F_i = forecasted risk premium of method i.

[b]Defined as arithmetic mean of $|A-F_i|$.

[c]Defined as arithmetic mean of $(A-F_i)^2$.

CONSTANT GROWTH METHOD

A second method of measuring the equity risk premium uses the Gordon-Shapiro [1956] constant growth of dividends model. In this model, the expected rate of return on the stock market equals a dividend yield variable on the market plus the anticipated growth rate of dividends. I write this model as follows:

$$RSTK = DYLD(1 + GROW) + GROW, \quad (3)$$

where

DYLD = the current dividend yield on the market, and

GROW = the nominal expected growth rate of market dividends.

Subtracting out the nominal riskless rate, RBILL, gives an expression for RPE:

$$RPE = DYLD(1 + GROW) + GROW - RBILL. \quad (4)$$

This view of the risk premium has some helpful features. It focuses attention on the two facets of expected market return, namely, yield and growth. The yield varies daily and creates an observable variation in the current risk premium that is not marred by averaging over many possibly irrelevant years. The growth term focuses attention on future growth, making this version of the risk premium future oriented in a way that looking at historical returns is not. The model's drawback is the unpleasant shortcoming that the anticipated growth rate of dividends is unobservable. Because of this, the model cannot measure the risk premium without an estimation of the anticipated long-run growth rate of dividends.

YIELD SPREAD METHOD

Yield spreads between different risk classes of bonds are thought to provide observable risk premiums among bond classes.[6] They can also help measure equity risk premiums if we invoke the Capital Asset Pricing Model (CAPM). In this model, the security market line is a linear relationship between the expected returns and betas of all assets, including bonds and stocks. The intercept of the security market line is the expected return on zero-beta assets, and the slope of the line is the expected stock market return minus the zero-beta return. In other words, the slope of the security market line is just the equity risk premium, RSTK-RBILL. If we measure two points along this line, then we can infer the slope of the line.

Let us measure the expected returns and betas of two different classes of bonds. The difference in yields-to-maturity between two types of bonds corresponds approximately to a difference in their expected returns. Once we estimate the betas of the bonds, we can then solve for the slope of the line and obtain an estimate of the equity risk premium.

Here is an example. Suppose that BAA bonds yield 0.9% more than AAA bonds. Suppose that their betas are .18 and .06, respectively. Then an estimate of the current risk premium is .009/.12 or .075, or 7.5%. If bond betas are stable, then changes in bond yield spreads tend to reflect changes in the equity risk premium.

The obvious variability in yield spreads through time suggests that equity risk premiums also vary through time in a systematic fashion, not simply because realizations do not equal expectations.[7] Because it focuses on current variation in risk premiums, the yield spread method is more consonant with the constant growth rate method than with the realized returns methods. It too has its problems, however, which include measurement of bond betas, the necessity of assuming that the security market line is linear, and the difficulty that the yields-to-maturity are not exactly the same as expected returns.

DIVIDEND YIELD METHOD

The main difficulty in using the constant growth model to measure the equity risk premium is in having to measure the anticipated growth rate of dividends. Application of the theory of economic growth provides a theoretical solution to the problem of having to measure the growth rate of dividends expected by the market and leads directly to the dividend yield method.

The alpha of growth models is the neoclassical steady state growth model that leads to a theorem famous in some circles, known as the Golden Rule of Accumulation. The Golden Rule states that, if the economy maximizes consumption per capita, then the rate of growth of output equals the physical marginal productivity of capital, which in turn equals the rate of interest.[8] If the Golden Rule of Accumulation is true of an economy, then in equilibrium the real growth rate of output equals the real rate of interest.

We assume that the real growth rate of dividends is directly related to the economy's real growth rate of output. If this is so, then real dividend growth approximately equals the real rate of interest. Adding expected inflation to each of these produces an equality between nominal dividend growth (GROW) and the nominal rate of interest (RBILL). Going back to Equation (4), we now see that GROW and RBILL cancel. This means that

$$RPE \approx DYLD(1 + RBILL). \quad (5)$$

Since DYLD $\times$ RBILL tends to be small compared to DYLD, the equity risk premium approximately equals the current dividend yield on stocks.

In short, the dividend yield method of estimating equity risk premiums states simply that RPE can be measured by DYLD(1 + RBILL). It also implies that fluctuations in the equity risk premium are measurable by fluctuations in this variable. Of course, most of the variability will come through the variability in dividend yields and not T-bill returns.

Since the term DYLD(1 + RBILL) crops up frequently in the ensuing discussion, we adopt the following important definition:

$$\begin{aligned} \text{DYRPM} &= \text{dividend yield risk premium measure} \\ &\equiv \text{DYLD}(1 + \text{RBILL}). \end{aligned} \tag{6}$$

A FIRST LOOK AT THE EVIDENCE

Suppose dividend yields measure ex ante risk premiums. Then we predict that the market is demanding a relatively low reward for holding equities when dividend yields are low. We should then see relatively low subsequent realized returns on stocks, assuming that the market gets what it demands. By contrast, when dividend yields are high, the market anticipates a relatively high reward for risk-bearing. In this case, we should observe subsequent high realized returns on stocks.

Looking backwards, we find that the highest average annual dividend yields (Ibbotson and Sinquefield [1982, p. 103]) occurred in 1949-1950 (7.72% and 8.30%), in 1932 (7.97%), and in 1941 (7.51%). Market history shows extremely interesting patterns subsequent to these dates. Ibbotson and Sinquefield (in highlighting the historical return data) happen to mention the very three time periods following the dates noted above, but without realizing their relationships to dividend yields. They report [1982, p. 37] that 5-year nominal holding period returns reached a high during the period 1950-1954, that 20-year nominal holding period returns reached a high during the period 1942-1961, that in *real* terms 1932-1936 was the highest 5-year holding period, and 1942-1961 was the highest 20-year holding period.

The lowest yield year in the 56 years of market history they studied was 1972, when yields averaged 2.95%. This was followed by an 8-year period in which common stocks provided an average annual real return of −4.0%. Other low-yield and low-risk premium years include 1961 and 1965 (both at 3.12%) and 1968 (3.18%). We duly note that subsequent time periods proved to be treacherous ones indeed for common stock investing, even if one bought and held over substantial time periods.

STRICT TEST OF THE MODEL

Although the above observations are interesting, they do not use all the data at our disposal. Since the market's ex ante equity risk premium is unobservable, we can only obtain indirect evidence on the validity and usefulness of DYRPM as a measure of RPE.

One thing we can do is to examine the relationship of DYRPM to the ex post risk premiums that we observe year by year. Using the time period 1926-1981, let us correlate DYRPM with the risk premium realized during the following year.[9] We obtain a significant correlation coefficient of 0.38. This suggests that the risk premium that investors receive in a given year is indeed positively related to our ex ante measure of the risk premium that the market demands at the start of the year.

Now let us conduct a predictive test by comparing the predictions of DYRPM to those of the realized risk premium method. Here is how we do this. At the close of the year 1961, we calculate DYRPM and this is one prediction of the equity risk premium for the following year. Similarly, we calculate the mean of the realized risk premiums over the years 1926-1961 and take this as the prediction that the realized risk premium approach gives us. In 1962 we update our predictions. This time we calculate DYRPM at the end of 1962 and then we calculate the average of the realized risk premiums for 1926-1962. In this way we obtain predictions for 1963. Proceedings in this fashion, we obtain 21 predictions for the years 1962-1982 for each method.[10]

Table 1 compares these predictions. Over this time period, the forecasts of the realized return method were biased upwards by 7.60%, since the mean forecast of this method was 9.94% while the mean realization was 2.34%. DYRPM's forecasts were virtually unbiased, since the mean of 4.15% was close to 2.34%. By another measure of forecast accuracy, the mean value of the absolute difference between forecast and realization, the DYRPM has a slight edge. It has an average error without regard to sign of 13.3% compared to the realized return method's average error of 13.8%. Finally, using the criterion of mean square error, DYRPM's MSE of .0249 is less than the MSE of .0317 of the realized risk premium method. This criterion gives more weight to the errors that are large, since all errors are squared in this method.

This evidence indicates that DYRPM provides a prediction of the equity risk premium that is superior to that of the realized risk premium method. Its bias is much less, its MSE is less, and its mean absolute error is less.

I do not wish to oversell the virtues of DYRPM as a risk premium measure. Although it may be superior to a popular contender, neither method is able to predict with much accuracy what the risk premium will be in any given year. I remind you that the *average* prediction error for risk premium is 13.3% for

DYRPM. Hence, any prediction of market return might be plus or minus 13.3% even in an average year. That is a large range of uncertainty.

Let us apply our findings to the 1983 situation. The average yield on the S&P 500 was 5.70% during 1982, while T-bill yields averaged about 10.24%.[11] Together these imply DYLD(1 + RBILL) was 6.28%. To obtain a prediction of the market's anticipated return on stocks for 1983, we first estimate what T-bill yields the market expects for 1983. The futures market in T-bills provides an average rate for the year of 8.25%.[12] Hence, an estimate of expected stock market returns for 1983 is 8.25% + 6.28% = 14.53%. The *latest* S&P 500 yield as of the end of 1982 was running at about 4.91%. Using this yield and the *latest* T-bill yields of about 8% gives a DYRPM of 5.30%. The market's anticipated return on stocks for 1983 using these recent data was therefore 8.00% + 5.30% = 13.30%; the actual figure was 22.34%.

So far we have seen that use of DYRPM as a measure of equity risk premium gives at least as good a measure as its competitor, the realized risk premium. Now consider a piece of complementary evidence that, however, is much less than a complete test.

I noted earlier that yield spreads could be converted to equity risk premiums with the help of bond betas. I will not attempt to do that in this paper, but do wish to point out that the *raw* and unconverted BAA/AAA yield spreads are highly related to the DYRPM variable. The correlation between the yield spread and DYRPM using the time period 1926-1981 (and omitting the U.S. Treasury-Federal Reserve Accord years 1941-1952) is +0.66.[13] This indicates that higher yield spreads are associated with higher dividend yields, which in turn we now know to be associated with realized risk premiums.[14]

MARKET RANDOM WALK

I promised to present evidence that market returns are not a random walk. The standard weak test of this proposition is to correlate market return in one period with market return in the preceding period. Nothing surprising happens when we do this with our data. The correlation is an insignificant +0.01.

On the other hand, the risk premium results above should lead us to suspect that returns do depend on *some* past data, if not on past returns. The major reason for fluctuation in the equity risk premium is the stock market return. Hence, we suspect that RSTK is related to *past* values of DYRPM or past values of DYRPM's main component, DYLD. Indeed this is so. The correlation coefficents of RSTK with DYRPM and DYLD are +0.36 and +0.35, respectively, over 1926-1982. Realistically, this is not a large correlation and does not present an immediate key to stock market riches.

For annual stock returns, the regression of market returns on past values of DYRPM gives a model like this:

$$\text{RSTK}(t+1) = -.1693 + 5.7519 \ \text{DYRPM}(t) \qquad (7)$$
$$\qquad\qquad\qquad (-1.61) \quad (2.80)$$

Adjusted R^2	= .11.
Standard deviation of residuals	= .207.
F-statistic	= 7.84.
Durbin-Watson statistic	= 1.91.

t-value shown in parentheses.

This regression provides solid evidence that aggregate stock market returns are not a random walk. On the other hand, there is no road to easy wealth here, since the standard error of estimate of the equation is high. Furthermore, who is to say that the high returns one can anticipate earning at such times as DYRPM is high are not fair recompense for a relatively risky investing environment? Nor is the model presented especially easy to implement. Small variations in one's estimate of DYRPM produce large differences in expected market returns. If, for example, we insert an DYRPM of .0628, our forecast for market return is −.1693 + 5.7519(.0628) = .192. If we insert the most recent DYRPM value of .053, we obtain an estimate of −.1693 + 5.7519(.053) = .136. Despite its faults, however, models of expected return of this type seem better than a naive alternative like assuming that next year's return will be the mean value of the returns of the past 50-odd years.[15]

The investor who is in for the long pull may take far greater heart from the above findings. We can greatly reduce the uncertainty in future return by investing over more than one year. Let us consider 9- or 10-year time periods. We ran DYRPM from low to high, keeping track of the year of its occurrence and the market return earned the *following* year. Then we grouped the years into six categories containing either 9 or 10 years. The results are shown in Table 2.

As DYRPM increases, notice that return earned in the following years rises monotonically. In fact, the relationship between return and DYRPM in these categories is strong and reliable.[16] The interpretation one must give to these findings runs as follows. If in 9 or 10 separate years, we observe dividend yields as low as 3% or so, then history shows that investment in the stock market after these 9 years produces low subsequent returns. The average in the past 56 years is only about −1%. This does not mean that every year or even a majority of years will give poor results.

TABLE 2

Base year values of DYRPM and stock returns in subsequent years.

Category[a]	DYRPM[b]	Stock Return	Standard Deviation[c]	Maximum[d]	Minimum[d]
1	.0329	-.0090	.1515	.1898	-.2647
2	.0383	.0679	.1787	.2689	-.2490
3	.0449	.0683	.2403	.4336	-.3503
4	.0515	.1650	.3052	.4767	-.4334
5	.0583	.1770	.1504	.3749	-.0491
6	.0706	.2260	.2144	.5399	-.1159

[a]Each category consists of 9 or 10 years.

[b]RPM = DYLD(1 + RBILL).

[c]Standard deviation of the realized returns within each category.

[d]Maximum and minimum annual realized returns within each category.

Even in the worst category, several reasonable return years occurred, such as 1972 and 1964. On the other hand, if we invest in years when dividend yields and DYRPM's are higher, for example, the .0515 of category 4, then history shows that on average we earn much higher returns, in fact handsome returns. This venture too is not without risk. This category includes the year 1931 when stocks fell some 43% on average.

What may we conclude from this analysis of market history? The dividend yield and its partner DYLD(1 + RBILL) are extremely important market parameters. They can help you segregate high and low return years on an ex ante basis. This is very valuable information for the long-run investor who is willing to invest over 9 or 10 annual periods. For the short-run investor, this knowledge is of limited help, for, clearly, lots of variation in stock market returns is left unexplained. For the academician, the evidence clearly indicates that the random walk model is not a valid depiction of market return behavior. It appears that expected market returns vary dramatically through time and hence the distribution of expected stock returns is not stationary.

BOND-STOCK YIELD SPREAD

In this section we apply the idea developed above — that the equity risk premium is approximately the dividend yield — to that murky financial construct called the bond-stock yield spread. We define the bond-stock yield spread (BSYS) as the yield-to-maturity on corporate bonds minus the current dividend yield on common stocks. With AAA bonds yielding about 11.9% at this writing and stocks in the S&P 500 index yielding 4.9%, the BSYS is just 7%.[17]

Using our earlier definitions, we write:

$$\text{BSYS} = \text{RCORP} - \text{DYLD}. \tag{8}$$

But using the constant growth model, we find that:

$$\text{DYLD} \approx \text{RSTK} - \text{GROW}. \tag{9}$$

This approximation sets DYLD(1 + GROW) equal to DYLD before solving for DYLD. This simplifies the algebra considerably, so that the main determinants of BSYS can be highlighted. Also, invoking the idea that GROW ≈ RBILL, we can write:

$$\begin{aligned} \text{BSYS} &\approx \text{RCORP} - \text{RSTK} + \text{RBILL} \\ &= \text{RBILL} - (\text{RSTK} - \text{RCORP}) \\ &= \text{RBILL} - \text{RP3} \\ &= \text{INF} + (\text{RR} - \text{RP3}). \end{aligned} \tag{10}$$

Hence, we interpret the bond-stock yield spread as being approximately equal to the expected rate of inflation plus the expected real rate of return minus the risk premium of stocks over corporate bonds.[18] Even though *none* of these three components is observable, which justifies our description of BSYS as murky, economic reasoning and past history provide some enlightenment.

The expected real rate of return and the risk premium are the consequences of basic economic forces such as tastes for future versus present consumption, investment opportunities, and tastes for risk. These are certainly not constant through time. Nevertheless, we suspect that RR and RP3 exhibit more stability through time than the expected rate of inflation. Our reason for this belief is that the inflation rate is the outcome of not only economic forces but also political forces. To check on this intuition, we sort the years 1926-1981 (excluding the Accord years 1941-1952) by the realized rate of inflation and find averages for the variables composing BSYS. Table 3 shows averages of the variables in those years in

TABLE 3

Average values of variables composing bond-stock yield spread in categories sorted by rate of inflation, 1926-1940 and 1953-1981.[a]

Category	BSYS	INF	RR	RP3
1	-.0142	-.0379	.0545	.0317
2	-.0069	.0077	.0112	.0266
3	.0010	.0213	.0010	.0221
4	.0269	.0415	.0039	.0201
5	.0462	.0981	-.0114	.0443
Average	.0098	.0245	.0124	.0318

[a]BSYS = bond-stock yield spread. INF = realized rate of inflation. RR = realized real rate of return. RP3 = DYLD(1+RBILL) + RBILL - RCORP.

which inflation was lowest (category 1) through the years in which inflation was highest (category 5).

RP3 is measured on an ex ante basis by measuring RSTK by the constant growth model DYLD (1 + RBILL) + RBILL and subtracting the yield to maturity on Moody's AAA bond index. Its variation is rather low, being on the order of 1% or so on either side of the mean value of 3.18%.[19] Real return and inflation are measured ex post and show much more variation. The range of the realized real rates of return is decidedly less than the range of realized inflation rates. Furthermore, were it not for category 1, realized real returns would be very stable. This supports our argument that expected real returns are more stable than expected inflation. Note that the most positive real returns occur in deflation and the most negative real returns occur in inflation. This is probably due to our noisy measure of expected inflation. A better measure of expected inflation would probably give an even smoother real return series.

These data tend to provide moderate support for the view that INF is the major source of variation in BSYS. Of course, mere arithmetic also helps insure that conclusion, for RR will tend to cancel out RP3.

Let us apply this model to 1982 data. Use our estimate for expected stock returns for 1983 that was given earlier as 13.30%. Hence, we would put RP3 at about 13.30% — 11.94% = 1.36%. If we estimate RR at its historical long-run average of 1.24%, which does not seem unreasonable in the weak economic environment of early 1983, then the rate of inflation expected by capital markets is roughly estimated as:

$$\begin{aligned} \text{INF} &\approx \text{BSYS} + \text{RP3} - \text{RR} \\ &= 7\% + 1.36\% - 1.24\% \\ &= 7.12\%. \end{aligned}$$

More exactly, when we substitute DYLD = (RSTK + RBILL)/(1 + RBILL) into Equation (8) and solve for INF, we obtain

$$\text{INF} = \frac{\text{BSYS} + \text{RP3}}{1 + \text{RCORP} - \text{BSYS}} - \text{RR}. \qquad (11)$$

This gives a more precise inflation estimate of 6.76%. A more direct method of estimation, which is algebraically identical, is simply to take the 8% T-bill rate and subtract the estimate of the real rate of return of 1.24% to give 6.76%.

According to our interpretation, we do not obtain independent information about INF by examining BSYS, over and above what we can extract from T-bill yields. Nevertheless, I believe that interpreting BSYS as approximately equal to INF + (RR − RP3) holds promise for gaining a deeper interpretation of past economic history.

Here is an example. Peter Bernstein has argued forcibly that BSYS measures expected inflation, although for reasons different from those presented here.[20] In examining the period 1952-1980, Bernstein found that from 1952-1960 and again from 1968-1979, the BSYS fell short of his measure of expected inflation (a moving average of past inflation). I would interpret this in my model as being normal and occurring because RP3 normally exceeds RR. That is, the risk premium of stocks over corporate bonds tends to be about 3% while the real return tends to be about 1%. On the other hand, Bernstein noticed that BSYS just equaled expected inflation over 1961-1967. I interpret this as arising from the approximate equality of RP3 and RR in those years. My guess is that RP3 maintained itself at about 3% and the real rate of interest rose from 1% to 3% during this longest of post-World War II expansion eras.

STOCK YIELDS, MARKET TIMING, AND MARKET EFFICIENCY

Charles H. Dow wrote [1920, p. 61]:

> "When a stock sells at a price which returns only about 3½ percent on the investment, it is obviously dear, except there be some special reason for the established price."

Nicholas Molodovsky [1978] referred to present-day Dow theorists, faithful to the founder's concept of value, who felt:

> "It would be advisable to begin selling stocks when the average yield on the Dow Jones Industrials recedes to the 3.5% area and to accumulate them when the average yield on the Dow Jones Industrials rises above the 6% level."

I have found that there is some meaning to these comments in the sense that there is good evidence that returns tend to be lower when the stock market is yielding 3½% than when it is yielding 6%. On the other hand, there is nothing magical whatsoever about such points as 3½% or 6%.

My evidence indicates that returns increase *continuously* and monotonically as dividend yield in the prior year increases. My theory that the dividend yield is a measure of the ex ante risk premium explains why this is so. High returns tend to occur when the environment is perceived to be so risky that investors demand a high premium for holding stocks. Low returns tend to occur when the environment is perceived to hold such little risk that investors demand a low risk premium for holding stocks.

Can dividend yields be used to time purchases and sales in the stock market? The evidence dictates an affirmative answer. Does this mean that the stock market is not efficient? Not necessarily. If the higher returns one earns in a high-yield situation reflect higher risk, then there is no necessary conflict with market efficiency. This paper contains no verdict on the question of market efficiency. To test that in the context of the findings presented here will require deeper analysis and tests. Those remain the subject of future research.

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[1] More precisely, I give the circumstances under which dividend yield times (1 + Treasury bill yield) measures the equity risk premium.

[2] A variable such as returns is a random walk when its successive values are independent drawings from a stationary distribution.

[3] For other interpretations of the bond-stock yield spread, see Molodovsky [1978] and Bernstein [1981].

[4] See Ibbotson and Sinquefield [1982] for estimates of these risk premiums using ex post realized returns.

[5] This figure is obtained by averaging the equity risk premiums shown in their Table B-11, page 112.

[6] See Lawler [1982], who shows that bond-yield spreads contain not only risk premiums but also default premiums. Hence, yield spreads may be noisy measures of risk premiums.

[7] Technically, equity risk premiums as measured by yield spreads are not a random walk in the levels. By contrast, realized equity risk premiums are a random walk in the levels.

[8] See Hans Brems [1973, pp. 64-65].

[9] I continue to use here and throughout the paper the Ibbotson and Sinquefield [1982] data. I estimated the 1982 S&P 500 Index return to be 20.46%, the 1982 average T-bill yield to be 10.24%, and the 1982 realized risk premium to be 10.22%.

[10] Two criteria selected prior to the experiment determined the sample period. One was to conduct the test over recent years, the second was to employ a sample size of at least 20.

[11] The 5.70% estimate of dividend yield is the average of the yields at the ends of the four quarters of 1982 on the S&P 500 Index, which I found to be 6.00%, 6.21%, 5.69%, and 4.91% (estimated). The 10.24% estimate of T-bill yields is the average of yields at the ends of the four quarters of 1982 on 30-day U.S. Treasury bills, which I found to be 14.62%, 11.45%, 6.88% and 8.01% (estimated). Data are from *Bank and Quotation Record, Standard & Poor's Security Price Index Record*, and St. Louis Federal Reserve *U.S. Financial Data*.

[12] This is an average of the March, June, September, and December 1983 futures contracts shown in the *Wall Street Journal* as of the last trading day of 1982.

[13] The U.S. Treasury-Federal Reserve Accord covered a time-period beginning in the early 1940s and ending (officially) in March 1951. Since Federal Reserve pegging of returns on Treasury bills may have disrupted normal bond return patterns, these years are omitted from the analysis. The yields used in this analysis are Moody's Index yields.

[14] Interestingly, bond yield spreads have virtually no direct correlation with future realized risk premiums.

[15] Our earlier approach of adding a risk premium estimate to a T-bill yield produced expected market returns of 14.53% and 13.30%, which are close to the 13.6% estimate but not to the 19.2% estimate, which is definitely on the high side.

[16] The regression of returns on DYRPM's shown in Table 2 produces an adjusted R^2 of 0.90 and a standard deviation of residuals of 0.028.

[17] The latest AAA yield is drawn from St. Louis Federal Reserve *U.S. Financial Data*.

[18] The exact expression which results when we use

$DYLD = (RSTK - RBILL)/(1 + RBILL)$ is more complex:

$$BSYS = \frac{INF + RR - RP3 + RCORP(RBILL)}{1 + RBILL}.$$

However, the term RCORP(RBILL) is small compared to the other terms in the numerator, and the denominator is roughly of magnitude one. Below we use this exact expression to find INF.

[19] Goldman Sachs reportedly has used a market-required rate of return of 3.0% above the AAA telephone bond rate. Hence, our measure of RP3 appears to be very close to the Goldman Sachs result. See Hawkins and Campbell [1978, p. 33].

[20] See Bernstein [1981]. Bernstein adopts Michael Keran's view that DYLD measures RR. When applied to BSYS, the result is that BSYS approximately equals INF.