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Stock Returns, Dividend Yields, and Taxes

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ABSTRACT

Using an improved measure of a common stock's annualized dividend yield, we document that risk-adjusted NYSE stock returns increase in dividend yield during the period from 1963 to 1994. This relation between return and yield is robust to various specifications of multifactor asset pricing models that incorporate the Fama–French factors. The magnitude of the yield effect is too large to be explained by a "tax penalty" on dividend income and is not explained by previously documented anomalies. Interestingly, the effect is primarily driven by smaller market capitalization stocks and zero-yield stocks.

DO STOCKS WITH HIGHER ANTICIPATED dividend yields earn higher risk-adjusted returns? This question has been the subject of considerable theoretical and empirical research. There are two central competing hypotheses: the tax-effect hypothesis and the dividend-neutrality hypothesis. The tax-effect hypothesis proposed by Brennan (1970) predicts that investors receive higher before-tax, risk-adjusted returns on stocks with higher anticipated dividend yields to compensate for the historically higher taxation of dividend income relative to capital gain income. In contrast, the dividend-neutrality hypothesis proposed by Black and Scholes (1974) states that if investors required higher returns for holding higher yield stocks, corporations would adjust their dividend policy to restrict the quantity of dividends paid, lower their cost of capital, and increase their share price.[1] Similarly, if investors required a lower return on high-yield stocks, value maximizing firms would increase their dividend payouts to increase their share price.[2] In an equilibrium, value maximizing behavior would lead to an aggregate supply of dividends that meets, but does not exceed, the aggregate demand for dividend income from investors that value dividends at least as highly as capital gains. As a result, there would be no predictable relation between anticipated dividend yields and risk-adjusted stock returns.

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[1] Firms could use excess cash to repurchase their stock or make additional investments. If these policies were suboptimal, a positive yield/return relation might exist.

[2] An investor's preference for dividends may arise from transaction costs or psychological reasons (e.g., see Shefrin and Statman (1984)).

Research that focuses on differences in returns among stocks with high and low anticipated long-run dividend yields has been mixed.[3] In their pioneering study, Black and Scholes (1974) find no statistically reliable link between a portfolio's monthly stock return and its long-run dividend yield. Blume (1980) and Keim (1985) document a U-shaped relation between risk-adjusted returns and yields, with zero-yield stocks realizing larger returns than dividend-paying stocks and higher yield stocks realizing larger risk-adjusted returns than lower yield stocks. Christie (1990) shows that the anomalous zero-yield result is largely due to the performance of stocks with a value of less than two dollars during the 1930s. Analyzing the returns of zero-yield stocks during the period 1945 to 1986 benchmarked against the performance of dividend-paying stocks of similar market capitalization, Christie finds that zero-yield stocks earn significantly lower returns than dividend-paying stocks. Though his evidence suggests a positive relation between dividend yields and returns, Christie argues that the magnitude of the effect is too large to be a tax effect and might be better explained by the market overvaluing the prospects of non-dividend-paying stocks.[4] Chen et al. (1990) show that tests relating returns to dividend yields are sensitive to the method of risk-return adjustment. For a sample of NYSE stocks *excluding* zero-yield stocks, they use a pooled cross-section, time-series regression methodology to document a positive yield/return relation when utilizing a single stock market factor model. However, when a default risk factor is included with the stock market factor, the relation between dividend yield and return disappears.

In this paper, we reexamine whether a yield effect exists and, if so, whether that effect can be explained by previously documented anomalies or taxes. To do so, we improve and extend on the existing literature in three ways. First, unlike past research that uses the prior year's ex post yield (e.g., Keim (1985)) to proxy for anticipated, long-run dividend yields, we employ a more current measure of dividend yield that uses the firm's most recently declared regular dividend and last share price to infer the firm's annual dividend yield. This provides a less stale measure of dividend yield.

Second, following Chen et al. (1990) and Fama and French (1993), we investigate whether a consistent relation between our yield measure and stock returns exists after adjusting for risk. In our analysis, we employ various asset pricing model specifications based on the three Fama–French (1996)

[3] There is also research that relates monthly stock returns to various measures of expected *within-month* dividend yield (e.g., Litzenberger and Ramaswamy (1979, 1980) and Miller and Scholes (1982)). This work has produced contradictory results, and it is unclear whether it reveals much about the longer-run relation between a stock's yield and its return. For more on the problems with these tests, see Miller and Scholes (1982) and Chen, Grundy, and Stambaugh (1990).

[4] Christie (1990) focuses on the return differential between zero-yield and positive yield stocks, but evidence presented in his Figure 5 suggests that returns may be increasing with dividend yield even if only positive yield stocks are examined. Christie, however, does not investigate this issue.

risk factors.[5] The Fama–French factors include the excess return on a broad market portfolio, the difference between the returns on portfolios of small and large stocks, and the difference between the returns on portfolios of high and low book-to-market equity stocks. Fama and French (1996) argue that a multifactor asset pricing model using these three factors provides a reasonable and parsimonious representation of stock returns because these factors capture much of the previously unexplained cross-sectional variation in returns on portfolios sorted by size, the ratio of the book value of common equity to its market value, earnings-to-price ratios, and past sales growth. This is of particular importance to our analysis because dividend yields tend to be correlated with past sales growth, earnings-to-price ratios, and book-to-market values.

Regardless of the model specification employed, we document a consistent positive relation between returns and current dividend yields that is too large to be explained entirely by taxes. The relation between dividends and returns is driven by stocks with below-median NYSE market capitalization. Though the effect is nonlinear due to disproportionately poor returns of zero-yield stocks, it is not merely a zero-yield effect.

The final contribution of the paper is to explore possible explanations for the yield effect. We pursue two explanations. One explanation is that the yield effect is proxying for other anomalies that have been documented in the empirical finance literature such as Loughran and Ritter's (1995) new issues puzzle or Basu's (1977) earnings-to-price effect. We present evidence inconsistent with this explanation. The second explanation is that a portion of the observed yield effect is due to taxes. To investigate this possibility, we examine whether the yield effect is strongest during time periods when there is "higher" relative taxation of dividend income. We use the implied tax rate from the U.S. Treasury and municipal fixed income markets as a proxy for the difference in taxation between taxable dividends and capital gains. In theory, the implied tax rate indicates the tax bracket that an investor would have to be in to be indifferent between taxable and nontaxable bonds. Under the tax-effect hypothesis, since interest income and dividend income are both taxed as ordinary income, one might expect that the implied tax rate from bond markets would approximate the marginal tax rate on dividend income. Furthermore, if capital gain income largely escapes taxation due to the ability to defer the realization of the gains, then the implied tax rate becomes a good proxy for the tax differential between dividend income and capital gain income. We find that the size of the yield effect appears to be unrelated to the level of the implied tax rate, and hence to the potential tax penalty from receiving dividend income. We also examine shocks to the implied tax rate series. To the extent that it is costly for high-yield firms to adjust their

[5] Fama and French (1993) also use their risk factors to analyze cross-sectional variation in average returns of dividend yield sorted portfolios, with yields based on Keim's (1985) dividend yield measure. They find a negative abnormal performance for zero-yield stocks. We refer to their work later in the paper.

dividend policy, we would expect that an unanticipated increase in the implied tax rate would lead to worse performance for higher yielding stocks. We find no support for a relation between shocks to the implied tax rate and return differences between high- and low-yield stocks. Consequently, it is difficult to attribute our documented yield effects to tax effects.

The paper proceeds as follows. Section I focuses on the issue of measuring dividend yields and the formation of yield portfolios. In Section II, we discuss the issue of risk adjustment and examine the yield effect and its sensitivity to various risk adjustments. Section III analyzes potential explanations for the yield effect. Section IV summarizes our results and offers some concluding thoughts.

I. Measuring Long Run Dividend Yields

Most researchers (e.g., Blume (1980), Keim (1985)) who have examined the link between long-run dividend yields and monthly stock returns define the dividend yield for a given month t as

$$DY_t = \frac{\sum_{k=1}^{12} D_{i,t-k}}{P_{i,t-13}}. \tag{1}$$

The problem with this measure of the prior year's ex post yield is that it may not reflect the anticipated dividend yield for the upcoming year. The yield measure may be stale because the level of the firm's dividend and stock price can shift over time. For instance, Christie (1990) notes that a firm can stop paying a dividend in a particular month, but still be listed as a high-yield firm for a few months if the dividend yield definition in equation (1) is used. Consequently, he modifies that yield measure for firms that either eliminate dividends or initiate them. This correction is adequate if one is interested in documenting return differences between zero-yield and dividend-paying firms, which is the main thrust of Christie's paper. It is less satisfactory if one wants to estimate the complete yield/return relation.

This problem can be solved for the set of firms paying regular quarterly dividends by using the most recently declared quarterly dividend prior to month t as an indicator of dividend level and using the most recent price, P_{t-1}, as the price level. As an example, if a firm's last dividend declaration was a quarterly dividend of 50 cents in month $t - 2$ and if the price at the end of $t - 1$ is \$50, then the annual dividend yield going into month t is 4 percent. In fact, this would be the yield reported in the financial stock tables of the *Wall Street Journal*.

In this study, we restrict our analysis to firms with an established track record of quarterly dividend payments because the frequent updating of a firm's dividend policy ensures a more accurate measure of dividend yield. In contrast, consider a financially struggling company that pays a once-a-year dividend. The market may anticipate that the dividend will be cut or terminated several months before the next scheduled dividend announcement. Hence, the firm's most recently declared annual dividend divided by its share price at the end of month $t - 1$ will overestimate the anticipated annual yield at the beginning of month t. With quarterly dividends, the dividend level is updated every few months.

The importance of an established dividend track record is twofold. First, there is evidence that dividend omissions are followed by abnormally low stock returns in the year after the omission and that dividend initiations are followed by abnormally high stock returns in the year after the initiation (see, for example, Christie (1990) and Michaely, Thaler, and Womack (1995)). These results are often attributed to market inefficiencies, and because we do not want our results driven by these previously identified anomalies, our selection procedure eliminates these stocks. Second, we wish to test whether different yield portfolios respond differently to tax rate shocks. Consequently, we want firms that have an established payout policy before we assign them a dividend paying status.

Using the Center for Research in Security Prices (CRSP) Monthly Master files of NYSE firms, we assign a stock to a nonzero dividend yield portfolio if both of the following criteria are met:[6]

1. A firm has either four quarterly ex-dividend dates in the prior twelve months ($t - 12$ through $t - 1$) or four quarterly dividend declaration dates in the prior twelve months.
2. A firm has no other dividend or distribution that is declared or goes ex-dividend (excluding stock splits and stock dividends) in the prior twelve months.

The first criterion ensures that firms have an established dividend-paying status, and the second criterion minimizes the number of firms that pay extra or special dividends that may or may not be recurring. The second criterion also eliminates firms that have gone through significant structural shifts that might affect dividend policy (e.g., a spin-off or partial liquidation). For stocks that meet the dividend-paying criteria in month $t - 1$, but fail to do so in month t, we use the *Wall Street Journal Abstracts*, *Standard & Poor's Dividend Record*, and *Standard & Poor's Corporation Record* to determine if there was an announcement that the firm would no longer pay its dividend prior to the end of month $t - 1$. Thus, a firm announcing in month $t - 2$ that it is eliminating its dividend is removed as a dividend-paying firm beginning in month $t - 1$.[7]

[6] The Appendix provides additional details on sample construction, including adjustments that are made to the CRSP Monthly Stock Tape.

[7] Without investigating news sources, the firm would not have been dropped until month t. We identify 884 dividend omission/postponement announcements.

To identify firms with an established policy of no dividend payments, we assign a firm to a zero-yield portfolio if it had no dividends or distributions (excluding stock splits and stock dividends) in the prior year and was listed on the CRSP NYSE monthly tapes for at least one year. This eliminates firms that have recently omitted their dividend or have gone public.

Another important concern with the dividend yield measure is its taxable status. Because we are interested in establishing whether yield effects are attributable to taxes, we only want to use firms paying taxable dividends. Though CRSP has a code that ex post identifies quarterly dividends as nontaxable, it is not clear that investors knew ex ante that these dividends would be nontaxable. Dividends paid by a corporation are nontaxable if they exceed the amount of taxable earnings that have been historically retained by the corporation. So, poor firm earnings that are divulged in month t could result in a dividend that was declared in $t - 1$ to be nontaxable, even though investors may have believed it to be taxable at $t - 1$. Hence, only using dividends classified as taxable by CRSP might result in upward biased returns for firms with positive anticipated dividends. To eliminate stocks that are likely to have nontaxable dividends without relying on ex post classifications, we eliminate any stock assigned to a positive yield portfolio if the stock paid any nontaxable quarterly dividends in the prior 24 to 13 months. Firms that in the recent past paid nontaxable dividends are far more likely to do so again in the near future. If in the past twelve months a firm pays a dividend that is ultimately classified as nontaxable, this might not be known until the firm finalizes its tax position later in the year. This is why we only eliminate observations for firms paying nontaxable dividends in the more distant period of 24 to 13 months before the month of portfolio formation.

Real Estate Investment Trusts (REITs), mutual funds, foreign corporations, and master limited partnerships are also eliminated from the sample to ensure uniformity of tax treatment and predictability of dividends.[8] We also eliminate stocks that have an "unsustainable" yield, defined as a dividend yield of 24 percent per year (or 2 percent on a monthly basis) or higher. Such yields are unlikely to be maintained even in the short run. Finally, stocks are excluded if their price is less than $2 per share. Such stocks might skew results because they suffer from considerable bid-ask bounce that could bias their measured returns upward. They also have disproportionate representation in zero-yield portfolios. In fact, Christie (1990) shows that the results of studies finding that zero-yield stocks outperform dividend-paying stocks (e.g., Keim (1985)) are attributable to these low-priced stocks.

[8] For example, dividends paid by REITs and closed-end bond funds do not receive a dividend exclusion at the corporate level. Limited partnership dividends are treated as a nontaxable return of capital and many REIT dividends are also treated as return of capital. Finally, because closed-end funds and REITs generally have rules about what their dividend payout must be to preserve their tax-free status, the future level of dividends for these firms is quite uncertain (see, e.g., Bradley, Capozza and Seguin (1996)).

For firms that meet all of the previously discussed screens, we measure dividend yield in month t as follows.[9] If D is the last declared quarterly dividend before the end of month $t - 1$ and P_{t-1} is the price at the end of month $t - 1$, we define our annual long-run yield measure, DY_t, as

$$DY_t = \frac{4D}{P_{t-1}}. \tag{2}$$

For each month t, we use each stock's dividend yield to sort stocks into ten equally sized nonzero-yield portfolios and one zero-yield portfolio[10] Our sample period runs from July 1963 through December 1994. This period is the largest sampling period for which all the data sources used in our study are available.

The average portfolio returns, standard deviations of returns, average portfolio yields, and average market values of the stocks in the dividend yield sorted portfolios are displayed in Panel A of Table I. Returns are generally increasing in yield, though the zero-yield portfolio has a higher mean return than the four lowest positive-yield portfolios. The time series standard deviation of portfolio returns is declining monotonically with yield, suggesting that higher yield stocks might be less risky. The average annual dividend yields range from zero to 8.292 percent. As in Keim (1985), the smallest market value stocks are in the zero-yield portfolio, and the next smallest-sized stocks are in the highest yield portfolio. Except for the highest yield portfolio, firm size is for the most part increasing with yield, suggesting that firms paying nontrivial dividends are larger, more mature firms.

Given the size distribution of the dividend yield portfolios and the documented relation between market capitalization and stock returns (e.g., Fama and French (1992)), we also sort portfolios on the basis of dividend yield and size. We sort our sample into five groups by yield: a zero-yield group of stocks and four equally sized positive-yield groups. We also sort our sample into four equally sized groups by market capitalization. We use the intersections of these classifications to form twenty yield/size based portfolios.[11] With the exception of the largest stock quartile, returns are generally increasing with dividend yield within size classifications. Given that there are

[9] In our sample, there is a total of 588,560 firm month observations, excluding REITs, limited partnerships, and closed-end funds. Of this total, we lose 75,385 observations due to the four quarterly dividends screen; 45,867 observations due to the no extraordinary/special dividend screen; 18,042 observations due to the requirement that the firm be listed for at least one year; 8,716 observations due to the $2 screen; 7,764 observations due to the discontinuance of dividend payments; and 554 observations due to the other screens.

[10] The average number of stocks in the zero-yield portfolio is 205, and the average number of stocks in the positive yield portfolios is 92.

[11] The average number of stocks in the zero-yield portfolios is 51, and the average number of stocks in the positive yield portfolios is 57.

Table I
Summary Statistics for Monthly Percent Portfolio Returns and Dividend Yields

These data are for NYSE firms during the period July 1963 to December 1994 (378 months). Panel A contains the summary statistics for the dividend yield formed portfolios. The returns and yields are in percentage terms. The average stock market values are in millions of dollars and are calculated as the simple monthly average of the market capitalizations in each respective portfolio from July 1963 to December 1994. Panel B contains the summary statistics, in percentage terms, for the dividend yield by size formed portfolios.

Panel A: Dividend Yield Formed Portfolios

Dividend Yield Portfolio	Monthly Portfolio Return (%)		Annual Dividend Yield (%)	Average Stock Market Value ($ million)
	Mean	Std. Dev.	Mean	Mean
Zero	1.164	7.639	0.000	237.9
Low	1.032	6.019	1.056	1315.0
2	1.035	5.630	1.896	1089.0
3	1.062	5.567	2.508	1186.9
4	1.042	5.491	3.048	1144.9
5	1.218	5.369	3.564	1364.4
6	1.320	5.204	4.068	1379.9
7	1.378	5.028	4.632	1366.4
8	1.427	4.801	5.340	1558.5
9	1.291	4.226	6.444	1585.7
High	1.278	4.200	8.292	880.5

Panel B: Dividend Yield and Size-Formed Portfolios

	Dividend Yield Portfolio									
	Average Monthly Return (%)					Average Annual Dividend Yield (%)				
Size	Zero	Low	2	3	High	Zero	Low	2	3	High
Small	1.324	1.298	1.336	1.652	1.603	0.000	1.848	3.180	4.524	6.960
2	0.880	1.129	1.259	1.533	1.410	0.000	1.74	3.180	4.488	7.008
3	0.969	1.125	1.091	1.287	1.227	0.000	1.596	3.168	4.524	7.044
Big	1.092	0.902	0.908	1.084	1.125	0.000	1.620	3.168	4.512	6.960

potentially large risk differences among these various portfolios, we now investigate the link between anticipated dividend yields and risk-adjusted returns.

II. Estimating Dividend Yield Effects

A. The Importance of Controlling for Risk

To document a relation between risk-adjusted returns and dividend yields, we must adequately control for risk. Most early work using either long-run or short-run yield measures controls only for overall stock market risk as

Table II

Summary Statistics for Monthly Percent Risk Factors

These data are for NYSE firms during the period July 1963 to December 1994 (378 months). MKT, SMB, and HML are the Fama and French (1996) risk measures. MKT is the one-month percentage return, in excess of the risk-free rate, on a value-weighted portfolio of NYSE, AMEX, and Nasdaq firms (from CRSP). SMB is the difference between the average returns on a three small-stock portfolios and three big-stock portfolios. HML is the difference between the average returns on two high-book equity/market equity portfolios and two low-book equity/market equity portfolios.

Risk Measures	Means	Standard Deviations
MKT	0.425	4.386
SMB	0.271	2.860
HML	0.451	2.569

measured by beta. To the extent that stock market betas are measured with error and/or inadequately capture all priced risks, Miller and Scholes (1982) argue that dividend yields can proxy for risk. For example, if two firms offer identical expected cash dividends, the firm with a greater level of "priced" risk would trade at a lower price and have a higher dividend yield. Similarly, if the levels of dividend payments are "sticky," firms that have experienced price declines will tend to have the highest dividend yields. They will also tend to be more levered and riskier because of shrinking equity values.

Consistent with these conjectures, Chen et al. (1990) find that although a yield effect appears to exist when only controlling for stock market risk, the yield effect becomes statistically indistinguishable from zero when a default risk factor is incorporated into their analysis. Similarly, Christie and Huang (1994) find little evidence of a consistent yield effect after adjusting returns for stock market capitalization effects.

In this paper, we employ multifactor asset pricing models based on the three factors proposed by Fama and French (1996).[12] These factors are the excess return on a broad market portfolio (MKT), the difference between the return on a portfolio of small stocks and the return on a portfolio of large stocks (SMB, small minus big), and the difference between the return on a portfolio of high book-to-market equity stocks and the return on a portfolio of low book-to market equity stocks (HML, high minus low). In Table II, we provide summary statistics on the three Fama–French risk factors.

B. Fama–French Regression Estimates

Fama and French (1996) form portfolios on the basis of various stock attributes (size, book-to-market, price-earnings ratio, and sales growth) that have historically produced abnormal returns in a CAPM framework. They

[12] We thank Ken French for providing us with these data.

then estimate the following model for monthly portfolio returns in excess of a one-month T-bill rate, R_{pt}:

$$R_{pt} = \alpha_p + \beta_{1p} MKT_t + \beta_{2p} SMB_t + \beta_{3p} HML_t + e_{pt}. \tag{3}$$

Fama and French (1996) report that the intercept terms, α_p, for each of their portfolios formed on the basis of some previous anomaly are generally statistically indistinguishable from zero. Furthermore, they cannot reject the null hypothesis that the α_p across their portfolios are jointly equal to zero. Thus, Fama and French conclude that their factors do a reasonable job of explaining cross-sectional variation in stock returns.

In Table III, we report OLS regression estimates of equation (3) for our eleven dividend yield sorted portfolios. The regression intercepts differ significantly from zero for a number of the portfolios. In particular, we find that the zero-yield portfolio has an intercept equal to -0.40 percent. This abnormal return of -4.8 percent per year is virtually identical to Christie's (1990) estimate of underperformance for zero-yield stocks during the period from 1946 to 1985. Three other portfolios have intercepts significantly different from zero. The fourth dividend yield portfolio has a significantly negative intercept equal to -0.16 percent. This portfolio has a slightly below average level of yield. Portfolios 7 and 8, with above average yields, have positive and significant intercepts of 0.14 percent and 0.19 percent, respectively. Interestingly, all of the higher yield portfolios (6 to High) have a positive intercept term, and three of the five lower yield portfolios (Zero to 4) have a negative intercept term. This suggests a yield effect, though one that is not perfectly monotonic. When all eleven regressions are jointly estimated, the GRS F-statistic of Gibbons, Ross, and Shanken (1989) testing whether all eleven intercepts are jointly equal to zero is 4.57 with a p-value below 0.0001. Hence, the hypothesis that the intercept terms are jointly equal to zero is soundly rejected. To ensure that the result is not driven solely by the zero-yield portfolio, we also calculate the GRS F-statistic to test the hypothesis that the ten positive yield intercepts are jointly equal to zero. This null hypothesis is also rejected at conventional significance levels, with a p-value for the GRS F-statistic of 0.001.

Table IV presents the intercepts and factor sensitivities for OLS regression estimates of equation (3) for the twenty dividend yield and size sorted portfolios. Of particular interest are the interactions between size and yield. For the below median size portfolios, there is a strong and fairly monotonic positive relation between dividend yield and the estimated intercept term. This relation weakens for the third size quartile and disappears for the highest market value firms. In fact, when we estimate all twenty equations jointly and perform the GRS F-test *within* each size quartile, we reject the hypothesis that the intercepts are jointly equal to zero within each quartile for each of the first three size quartiles at the 1 percent level. For the largest size quartile, we cannot reject the hypothesis that the intercepts are jointly equal

Table III

Three-Factor Regressions for Eleven NYSE Portfolios Formed on Dividend Yield

Regressions: $R_{pt} = \alpha_t + \beta_{1p}MKT_t + \beta_{2p}SMB_t + \beta_{3p}HML_t + e_{pt}$.

These data are for NYSE firms during the period July 1963 to December 1994 (378 months). R_{pt} is the one-month excess return on the pth dividend yield formed portfolio. R_f is the one-month Treasury bill rate observed at the beginning of the month (from CRSP). The explanatory variables are MKT ($R_{Mt} - R_f$), SMB, and HML. MKT is the excess return on the CRSP value-weighted portfolio of NYSE, AMEX, and Nasdaq stocks. SMB is the difference between average returns on three small-stock portfolios and three big-stock portfolios. HML is the difference between the average returns on two high–book equity/market equity portfolios and two low–book equity/market equity portfolios. Fama and French (1996) provide a detailed discussion of MKT, SMB, and HML. GRS is the F-statistic of Gibbons et al. (1989) which tests the hypothesis that the regression intercepts for a set of portfolios are jointly equal to zero. t-statistics are in parentheses.

Dividend Yield Portfolio	Intercept: α	MKT: β_1	SMB: β_2	HML: β_3
Zero	−0.401	1.239	1.383	0.373
	(−4.092)	(50.747)	(39.400)	(9.394)
Low	0.090	1.120	0.469	−0.347
	(1.150)	(57.326)	(16.719)	(−10.916)
2	0.013	1.098	0.460	−0.145
	(0.215)	(70.843)	(20.644)	(−5.732)
3	−0.036	1.098	0.503	−0.002
	(−0.560)	(69.049)	(22.021)	(−0.078)
4	−0.160	1.103	0.540	0.203
	(−2.464)	(68.270)	(23.233)	(7.707)
5	−0.008	1.093	0.508	0.285
	(−0.113)	(63.712)	(20.594)	(10.221)
6	0.093	1.079	0.461	0.328
	(1.416)	(65.640)	(19.520)	(12.258)
7	0.141	1.046	0.433	0.399
	(1.973)	(58.830)	(16.942)	(13.789)
8	0.190	0.999	0.423	0.448
	(2.700)	(56.869)	(16.777)	(15.691)
9	0.082	0.867	0.329	0.566
	(0.984)	(41.559)	(10.992)	(16.700)
High	0.106	0.741	0.237	0.660
	(0.777)	(21.796)	(4.838)	(11.927)

GRS F-statistic = 4.57 (p-value = 0.000).

to zero at the 10 percent significance level. This pattern seems difficult to reconcile with a pure tax effect. Tax effects should exist independent of firm size unless nontaxable clienteles of investors primarily hold larger stocks. This is only plausible if nontaxable investors dominate the more liquid, high market capitalization sector. Also of interest in Table IV, the patterns of the intercepts suggest higher returns for smaller capitalization stocks relative to

Table IV

Three-Factor Regressions for Twenty NYSE Portfolios Formed on Dividend Yield and Siz

Regressions: $R_{pt} = \alpha_t + \beta_{1p}MKT_t + \beta_{2p}SMB_t + \beta_{3p}HML_t + e_{pt}$.

These data are for NYSE firms during the period July 1963 to December 1994 (378 months). R_{pt} is the one-month excess return on the pth dividend yield and size formed portfolio. R_f is the one-month Treasury bill rate observed at the beginning of the month (from CRSP). The explanatory variables are MKT ($R_{Mt} - R_f$), SMB, and HML. MKT is the excess return on the CRSP value-weighted portfolio of NYSE, AMEX, and Nasdaq stocks. SMB is the difference between average returns on three small-stock portfolios and three big-stock portfolios. HML is the difference between the average returns on two high–book equity/market equity portfolios and two low–book equity/market equity portfolios. Fama and French (1996) provide a detailed discussion of MKT, SMB, and HML. GRS is the F-statistic of Gibbons et al. (1989) which tests the hypothesis that the regression intercepts for a set of portfolios are jointly equal to zero. t-statistics are in parentheses.

	Dividend Yield Portfolios									
Size	Zero	Low	2	3	High	Zero	Low	2	3	High
	Intercept: α					MKT: β_1				
Small	−0.428	−0.180	−0.101	0.255	0.264	1.203	1.165	1.049	0.992	0.833
	(−3.253)	(−1.201)	(−0.889)	(2.243)	(2.100)	(36.712)	(31.178)	(36.859)	(35.034)	(26.558)
2	−0.578	−0.110	−0.059	0.220	0.197	1.254	1.158	1.091	1.031	0.769
	(−4.740)	(−1.196)	(−0.725)	(2.640)	(1.965)	(41.268)	(50.496)	(54.150)	(49.693)	(30.754)
3	−0.367	0.112	−0.094	0.072	0.075	1.340	1.109	1.111	1.059	0.824
	(−2.327)	(1.306)	(−1.260)	(0.899)	(0.763)	(34.097)	(51.722)	(59.502)	(53.285)	(33.724)
Big	0.112	0.097	−0.080	0.001	−0.006	1.200	1.082	1.107	1.076	0.890
	(0.566)	(1.542)	(−1.196)	(0.019)	(−0.058)	(24.281)	(68.689)	(66.408)	(61.340)	(35.374)
	SMB: β_2					HML: β_3				
Small	1.658	1.180	1.082	0.976	0.791	0.658	0.373	0.451	0.480	0.611
	(35.192)	(21.978)	(26.453)	(23.971)	(17.546)	(12.344)	(6.147)	(9.754)	(10.415)	(11.980)
2	1.288	0.931	0.889	0.729	0.469	0.180	0.0002	0.261	0.406	0.586
	(29.498)	(28.243)	(30.707)	(24.451)	(13.067)	(3.645)	(0.005)	(7.951)	(12.026)	(14.433)
3	0.955	0.525	0.509	0.403	0.228	0.028	−0.214	0.177	0.356	0.544
	(16.914)	(17.027)	(18.978)	(14.101)	(6.483)	(0.441)	(−6.135)	(5.821)	(11.027)	(13.695)
Big	0.517	0.070	−0.030	−0.009	0.003	−0.368	−0.377	0.067	0.293	0.568
	(7.276)	(3.107)	(−1.268)	(−0.339)	(0.076)	(−4.580)	(−14.718)	(2.459)	(10.285)	(13.883)

GRS F-statistic = 4.16 (p-value = 0.000).

larger capitalization stocks among high yield stocks, but higher returns for larger capitalization stocks relative to smaller capitalization stocks among the low-yield and zero-yield portfolios.

It is worth contrasting our results with those of Fama and French (1993). Fama and French sort NYSE, AMEX, and Nasdaq stocks into six dividend yield portfolios, a zero-yield portfolio and five positive yield portfolios, and estimate regression (3) for each portfolio. They report a statistically significant, negative intercept for the zero-yield portfolio, though only about half of the magnitude of our zero-yield portfolio intercept. The intercepts on all positive yield portfolios are statistically indistinguishable from zero. The yield portfolios formed by Fama and French are value weighted, and their yield measure is based on the past year's realized yield. Though we have more to say in the next section about the sensitivity of our results to the yield measure employed, it is clear that value weighting is important, because yield effects do not show up among the largest quartile of stocks.

C. Estimating a Dividend Yield Coefficient

The results from the previous section suggest the existence of a yield effect on stock returns. It is useful, however, to obtain a direct yield coefficient to estimate the magnitude of the yield effect and to check the robustness of that effect to alternative model specifications. In particular, consider the returns-generating equation for a standard multifactor asset pricing model with three factors and a dividend yield effect:

$$R_{pt} = E(R_{pt}) + \beta_{1p}[F_{1t} - E(F_{1t})] + \beta_{2p}[F_{2t} - E(F_{2t})] + \beta_{3p}[F_{3t} - E(F_{3t})] + e_{pt}, \tag{4}$$

where R_{pt} is the return on the pth portfolio, β_{ip} is the sensitivity of the pth portfolio to the ith risk factor, and F_{it} is the ith risk factor.

The expected returns are given by:

$$E(R_{pt}) = \lambda_0 + \beta_{1p}\lambda_1 + \beta_2\lambda_2 + \beta_3\lambda_3 + \lambda_4 d_{pt-1}, \tag{5}$$

where λ_0 is the risk free or zero-beta rate, λ_i is the risk premium corresponding to the ith risk factor where $i = 1$ to 3, λ_4 is the coefficient on the dividend yield measure, and d_{pt-1} is the dividend yield on the pth portfolio less the value-weighted stock market dividend yield.

Combining the pricing restriction of equation (5) with the returns-generating equation (4) yields a system of equations of the form:

$$R_{pt} = \lambda_0 + \beta_{1p}[F_{1t} + \lambda_1^*] + \beta_{2p}[F_{2t} + \lambda_2^*] + \beta_{3p}[F_{3t} + \lambda_3^*] + \lambda_4 d_{pt-1} + e_{pt}, \tag{6}$$

where $\lambda_i^* = \lambda_i - E(F_{it})$ for $i = 1$ to 3.

Substituting in the Fama–French risk factors, we obtain the following empirical model:

$$R_{pt} = \lambda_0 + \beta_{1p}[MKT_t + \lambda_1^*] + \beta_{2p}[SMB_t + \lambda_2^*] + \beta_{3p}[HML_t + \lambda_3^*] + \lambda_4 d_{pt-1} + e_{pt}. \tag{7}$$

Note that the dividend yield measure, d_{pt-1}, is the net of the value-weighted stock market dividend yield. This keeps the primary focus on the cross-sectional differences in yields rather than on the time series differences. Consistent with the tax literature, equation (7) assumes a linear yield-return relation. We relax this assumption later. The dividend yield, d_{pt-1}, is also converted into monthly terms by dividing the annual dividend yield by 12. Note also that the return on the pth portfolio, R_{pt}, is in excess of the T-bill rate and λ_0 is the excess zero-beta rate.

The specification shown in equation (7) differs from the Fama and French (1996) three-factor model estimated in equation (3), where the dividend yield term is eliminated and it is assumed that $\lambda_1^* = \lambda_2^* = \lambda_3^* = 0$. Assuming that $\lambda_1^* = \lambda_2^* = \lambda_3^* = 0$ means that the estimates of the average risk premiums for bearing a unit of each respective factor beta are estimated by the mean levels of MKT, SMB, and HML reported in Table II. Similar to Chen et al. (1990), we estimate the system of equations implied by equation (7) without imposing the restriction that $\lambda_1^* = \lambda_2^* = \lambda_3^* = 0$ using nonlinear seemingly unrelated regression (SUR) procedures.[13] This allows us to simultaneously estimate the factor sensitivities, each risk premium, and the dividend yield coefficient.

The nonlinear SUR estimates of model (7) are reported in Panel A of Table V. The main hypothesis of interest is whether $\lambda_4 = 0$. For both the eleven yield portfolios and the twenty dividend yield and size sorted portfolios, we find a large and statistically significant coefficient on the dividend yield variable. In fact, the yield parameter seems too high to be consistent with a pure tax effect. For instance, the results suggest that a stock with a 5 percent yield versus a zero yield should result in a return differential of roughly 8 percent to 8.72 percent per year. Under any realistic assumption about capital gains tax rates and realizations, this result suggests a marginal ordinary tax rate of more than 100 percent!

Chen et al. (1990) show that factor betas appear to fluctuate with dividend yields. They also find that when betas are allowed to vary with yield levels, coefficient estimates of the yield effect decrease. To account for this, we pursue an approach similar to that of Chen et al. (1990) in which the risk exposures are modeled explicitly as linear functions of dividend yields. In particular,

$$\beta_{ip} = \delta_{ip} + \theta_{ip} d_{pt-1}. \tag{8}$$

[13] Equation (7) resembles the specification employed by Chen et al. (1990), except they only use two risk factors in their analysis: a stock market risk factor and a default risk factor.

Table V

Nonlinear Seemingly Unrelated Regressions with Three Factors Plus Dividend Yields

These data are for NYSE firms during the period July 1963 to December 1994 (378 months). Estimates of the risk premia and yield parameters are obtained by estimating each of the portfolio equations within each portfolio sort simultaneously using iterated nonlinear seemingly unrelated regression procedures. The number of equations in each estimation corresponds with the number of portfolios in each portfolio group. The dividend yield formed portfolios contain eleven portfolios, the dividend yield and size formed portfolios contain twenty portfolios. For the results reported in Panel A, we estimate the system of equations (i) below, and for Panel B the system of equations (ii) below is estimated.

$$R_{pt} = \lambda_0 + \beta_{1p}[MKT_t + \lambda_1^*] + \beta_{2p}[SMB_t + \lambda_2^*] + \beta_{3p}[HML_t + \lambda_3^*] + \lambda_4 d_{pt-1} + e_{pt} \tag{i}$$

$$R_{pt} = \lambda_0 + \sum_{i=1}^{3} (\delta_{ip} + (\theta_{ip} d_{pt-1}))[F_{it} + \lambda_i^*] + \lambda_4 dp_{t-1} + e_{pt}, \tag{ii}$$

where R_{pt} is the monthly percentage return on portfolio p in excess of the one-month Treasury bill return from CRSP. MKT (F_1) is the excess return on the CRSP value-weighted portfolio of NYSE, AMEX, and Nasdaq stocks. SMB (F_2) is the difference between average returns on three small-stock portfolios and three big-stock portfolios. HML (F_3) is the difference between the average returns on two high–book equity/market equity portfolios and two low–book equity/market equity portfolios. Fama and French (1996) provide a detailed discussion of MKT, SMB, and HML. d_{pt-1} (YLD) is the equally weighted dividend yield of stocks in portfolio p minus the market dividend yield. $\lambda_i^* = \lambda_i - E(F_{it})$ where λ_i is the risk premium associated with the ith factor. t-statistics from heteroskedastic-consistent (Robust-White) standard errors are in parentheses.

Portfolio Sort	Intercept: λ_0	MKT: λ_1^*	SMB: λ_2^*	HML: λ_3^*	YLD: λ_4
Panel A: Yield Effects *without* Yield and Risk Interactions					
Dividend yield	−1.666	1.860	−0.403	−0.262	1.608
	(−2.534)	(2.764)	(−1.499)	(−1.033)	(3.152)
Dividend yield and size	0.408	−0.350	0.241	−0.850	1.744
	(1.010)	(−0.909)	(3.277)	(−5.497)	(4.740)
Panel B: Yield Effects *with* Yield and Risk Interactions					
Dividend yield	−1.437	1.510	−0.109	−0.461	1.901
	(−2.850)	(3.023)	(−0.467)	(−1.985)	(3.615)
Dividend yield and size	0.024	0.016	0.175	−0.771	1.756
	(0.068)	(0.049)	(2.318)	(−4.669)	(4.825)

Substituting the dividend related parameter changes of equation (8) into equation (6), we get

$$R_{pt} = \lambda_0 + \sum_{i=1}^{3} (\delta_{ip} + (\theta_{ip} d_{pt-1}))[F_{it} + \lambda_i^*] + \lambda_4 d_{pt-1} + e_{pt}. \tag{9}$$

As the system of model (9) shows, the level of factor betas is allowed to vary linearly with the portfolio's net dividend yield. The results from this estimation using nonlinear SUR procedures are presented in Panel B of

Table V. In this case, the coefficient estimates of λ_4 are about the same as those reported in Panel A. Again there is a strong positive relation between yields and returns.

The specifications in models (7) and (9) assume a linear yield-return relation, but the results in Tables III and IV suggest that the relation may be nonlinear. In particular, zero-yield stocks appear to be poorly performing outliers. This suggests that the large magnitude of the yield coefficient might be driven by zero-yield stocks. To capture this possibility, we estimate equation (7) with the addition of a zero-yield dummy variable. The results in the top panel of Table VI are somewhat mixed. For both portfolio groups, the dividend yield coefficient is still highly significant and drops only slightly. The coefficient on the zero-yield dummy for the eleven dividend yield sorted portfolios is negative and statistically significant at the 5 percent level, but for the twenty dividend yield/size sorted portfolios the zero-yield dummy coefficient is only −0.051 percent and statistically indistinguishable from zero at conventional significance levels.

In the bottom panel of Table VI, we report estimates of equation (7) with a zero-yield dummy and an additional restriction that $\lambda_1^* = \lambda_2^* = \lambda_3^* = 0$. This restriction basically accepts that the average pricing of the Fama and French factors is equal to their unconditional sample means.[14] With this added restriction, a more definitive nonlinear yield effect appears and the dividend yield coefficient drops a bit. For instance, the zero-yield dummy coefficient for the twenty portfolio case is −0.296 percent with a t-statistic of −2.94, and the yield coefficient equals 0.814 with a t-statistic of 4.08. The interpretation of this result is that for every 1 percent increase in yield there is a 0.814 percent increase in return with zero-yield stocks underperforming the regression line by an additional −0.296 percent per month.

The results in Table VI illustrate that even after allowing for the inclusion of a zero-yield dummy a large and significant yield effect remains. It is worth noting, however, that the magnitude of the yield effect coefficient is quite sensitive to restrictions imposed on the factor risk premiums. For example, for the twenty portfolio estimates, the yield coefficient is 1.693 and the zero-yield dummy is insignificant when no restrictions are placed on the factor risk premiums. However, when the premiums are restricted to their sample means, the yield coefficient falls to 0.814 and the zero-yield dummy is significantly negative. The explanation for this primarily lies in the premium estimate for the book-to-market (HML) risk factor. The large negative coefficient indicates that portfolio returns are negatively related to the sensitivity with respect to the HML factor. This occurs because returns correlate more strongly with the dividend yield coefficient, which tends to be positively correlated with the HML factor sensitivities. Hence, stock returns appear to be more related to the stock yield characteristics than the HML

[14] This restriction is also employed by Brennan and Subrahmanyam (1996) in testing for liquidity effects with the Fama–French factors.

Table VI
Nonlinear Seemingly Unrelated Regressions with Three Factors, Dividend Yields and Zero–Yield Dummy Variables

These data are for NYSE firms during the period July 1963 to December 1994 (378 months). Estimates of the risk premia and yield parameters are obtained by estimating each of the portfolio equations within each portfolio group simultaneously using iterated nonlinear seemingly unrelated regression procedures. The number of equations in each estimation corresponds with the number of portfolios in each portfolio sort. The dividend yield formed portfolios contain eleven portfolios, the dividend yield and size formed portfolios contain twenty portfolios. For the results reported under the inclusion of the zero-yield dummy, we estimate the system of equations (iii) below, while for the results under the inclusion of the zero-yield dummy and premia restriction the system of equations (iv) below is estimated.

$$R_{pt} = \lambda_0 + \beta_{1p}[MKT_t + \lambda_1^*] + \beta_{2p}[SMB_t + \lambda_2^*] + \beta_{3p}[HML_t + \lambda_3^*] + \lambda_4 d_{pt-1} + \phi_1 ZDUM + e_{pt} \quad \text{(iii)}$$

$$R_{pt} = \lambda_0 + \beta_{1p}[MKT_t] + \beta_{2p}[SMB_t] + \beta_{3p}[HML_t] + \lambda_4 d_{pt-1} + \phi_1 ZDUM + e_{pt}, \quad \text{(iv)}$$

where R_{pt} is the monthly percentage return on portfolio p in excess of the one-month Treasury bill return from CRSP. MKT (F_1) is the excess return on the CRSP value-weighted portfolio of NYSE, AMEX, and Nasdaq stocks. SMB (F_2) is the difference between average returns on three small-stock portfolios and three big-stock portfolios. HML (F_3) is the difference between the average returns on two high–book equity/market equity portfolios and two low–book equity/market equity portfolios. Fama and French (1996) provide a detailed discussion of MKT, SMB, and HML. d_{pt-1} (YLD) is the equally weighted dividend yield of stocks in portfolio p minus the market dividend yield. $\lambda_i^* = \lambda_i - E(F_{it})$ where λ_i is the risk premium associated with the ith factor and ZDUM are zero-yield indicator variables. t-statistics from heteroskedastic-consistent (Robust-White) standard errors are in parentheses.

Portfolio Sort	Intercept: λ_0	MKT: λ_1^*	SMB: λ_2^*	HML: λ_3^*	YLD: λ_4	ZDUM: ϕ_1
Inclusion of zero–yield dummy						
Dividend yield	−1.226	1.705	−0.352	−0.202	1.466	−0.259
	(−1.792)	(2.154)	(−2.049)	(−0.537)	(2.751)	(−1.969)
Dividend yield and size	0.380	−0.324	0.240	−0.819	1.693	−0.051
	(0.932)	(−0.835)	(3.272)	(−4.936)	(4.401)	(−0.437)
Inclusion of zero–yield dummy and premia restriction ($\lambda^* = 0$)						
Dividend yield	0.056	—	—	—	0.636	−0.284
	(1.575)				(2.842)	(−2.402)
Dividend yield and size	0.057	—	—	—	0.814	−0.296
	(1.724)				(4.078)	(−2.944)

factor sensitivity. From our viewpoint, the important issue is that a yield effect emerges regardless of the model specification.[15]

As an additional robustness check, we also estimate models (7) and (9) using five macroeconomic risk factors in place of the Fama–French factors. The risk factors are similar to those used in the asset pricing literature (e.g., Chen, Roll, and Ross (1986), Chan, Chen, and Hsieh (1985), and Ferson and Harvey (1991), among others).[16] Again, the estimated yield coefficient, with or without the inclusion of the zero-yield dummy, always exceeds 1.5 and is significantly different from zero at the 1 percent level. Given the similarities in findings and given that He and Ng (1994) find that the Fama–French measures tend to subsume risk exposures associated with traditional macroeconomic factors, we only report results using the Fama–French factors.[17]

Unlike Chen et al. (1990), we find a strong and consistent dividend yield coefficient. The differences between our results do not stem from the version of the multifactor model estimated. In fact, when we estimate their two-factor model with a stock market and a default risk factor, we obtain an even stronger yield effect than reported above. Similarly, our results do not differ simply because we include zero-yield portfolios in our analysis, which Chen et al. (1990) exclude. When we estimate our models excluding zero-yield portfolios, our yield coefficients remain highly significant. Furthermore, our results do not differ because of differences in sample periods. Our sample period extends from 1963 to 1994 and their sample period is from 1943 to 1978, but when we replicate their analysis using their dividend yield measure for our sample period, we find no significant yield effect.

Among the population of dividend paying stocks, our results differ from Chen et al.'s (1990) because of differences in the dividend measure used and the frequency of portfolio rebalancing based on that measure. Chen et al. (1990) use Keim's (1985) dividend yield measure and form their yield portfolios on a once-a-year basis. Hence, their portfolio yield measures are more stale than our measures that use contemporaneous information and are up-

[15] In the case of the eleven yield sorted portfolios, the yield coefficient is also half as large when the sample mean premium restriction is imposed. In this case, the shift in yield coefficient is more attributable to the high-risk premium coefficient for bearing stock market risk estimated in the unrestricted premium specification. The risk premium estimates are more precise for the twenty portfolio case because there is greater cross-sectional variation in risk factor sensitivities in this case.

[16] Besides the stock market risk factor MKT, these factors include a default premium, PREM, a term structure premium, TERM, the growth rate in monthly industrial production, GIP, and unanticipated inflation, UI. PREM is measured as the return on long-term corporate bonds less the return on long-term government bonds. TERM is measured as the return on long-term government bonds less the return on a 30-day Treasury bill. GIP is the monthly growth rate of industrial production. UI is measured by the residuals from an ARIMA(0,1,1) model.

[17] We also perform two additional robustness checks. First, we allow for seasonality in the dividend yield effect as documented by Keim (1985). Though we are able to find a modest U-shaped yield/return pattern in the month of January, it has little effect on our reported yield coefficient, λ_4, and its significance. For the second check, we include each portfolio's average $1/P_{t-1}$ as an additional explanatory variable in each of our specifications based on Miller and Scholes' (1982) conjecture that $1/P_{t-1}$ may proxy for risk and be correlated with dividend yields. Again, this variable has little effect on our reported yield coefficient, λ_4.

dated on a monthly basis. In fact, when we update their yield measure on a monthly basis, we can reject the hypothesis that the yield coefficient is equal to zero at the 10 percent level.[18] Furthermore, if we update our yield measure only once a year, we reject the hypothesis that our dividend yield coefficient equals zero at the 5 percent level, whereas with monthly updating we reject it at the 1 percent level.

III. Potential Explanations for the Dividend Yield Effect

A. Are Yield Effects Explained by Other Return Anomalies?

While our results suggest that current dividend yields can explain variation in stock returns, it is unclear why. Loughran and Ritter (1996) suggest that any return predictability attributed to a particular variable could merely be a manifestation of other correlated effects. In particular, they argue that return anomalies related to earnings-to-price, cash-flow-to-price, sales growth rank, and book-to-market ratios (Lakonishok, Shleifer, and Vishny (1994)) and the performance of stocks following new stock issuances (Loughran and Ritter (1995)) are all related to the historically superior performance of value stocks relative to growth stocks. Dividend yield effects could also fit into this explanation since stocks with higher dividend yields tend to have fewer growth opportunities.

To see if the yield effect is just proxying for other documented anomalies, we conduct a number of tests. Our first test involves the possibility that the yield effect is due to the poor performance of stocks after a stock issuance. Loughran and Ritter (1995) demonstrate that the stocks of firms that have issued stock in an initial public offering (IPO) or secondary offering (SEO) underperform other equities for a five-year period after issuance. Firms that issue equity are likely to be smaller, fast-growing firms that pay either no dividends or small dividends. These are the same types of firms that heavily influence our results. To investigate this issue, we identify all IPOs and all SEOs made by the firms in our NYSE sample going back to July 1958. Following Loughran and Ritter (1995), we exclude utility stock offerings and only include secondary offerings where the firm raised funds.[19] If a firm had an equity issue meeting these criteria, it is excluded from our sample for five years. This additional restriction on the data eliminates 19.2 percent of the observations from our previous sample.

Using this reduced sample, we reestimate the basic Fama–French regressions reported in Tables III and IV for eleven dividend yield sorted portfolios and twenty dividend yield and size sorted portfolios. The intercept

[18] This is based on estimating equation (7) with the Fama–French factors. When we estimate the same equation using only the market and default factor, as in Chen et al. (1990), we also reject the null hypothesis of no yield effect at the 10 percent significance level.

[19] For the years 1970 to 1994, data on IPOs and SEOs used in Loughran and Ritter (1995) were graciously provided to us by Tim Loughran and Jay Ritter. For earlier years, we search the Standard & Poor's Corporate Records for each NYSE firm to obtain the stock issuance history. Following Loughran and Ritter (1995), we identify the stock offer dates for each firm that made an IPO or raised funds for its company through an SEO.

Table VII

Three-Factor Regression Intercepts for NYSE Dividend Yield Portfolio Sorts Excluding Firms with IPOs and SEOs for Five Years

Regressions: $R_{pt} = \alpha_t + \beta_{1p} MKT_t + \beta_{2p} SMB_t + \beta_{3p} HML_t + e_{pt}$.

These data are for NYSE firms during the period July 1963 to December 1994 (378 months). Panel A provides the results for the eleven NYSE dividend yield formed portfolios, Panel B provides the results for the twenty dividend yield and size formed portfolios. For the above portfolios, we exclude all firms from the sample for five years following an initial public offering (IPO) or secondary equity offering (SEO). R_{pt} is the one-month excess return on the pth portfolio, and R_f is the one-month Treasury bill rate observed at the beginning of the month (from CRSP). The explanatory variables are MKT ($R_{Mt} - R_f$), SMB, and HML. MKT is the excess return on the CRSP value-weighted portfolio of NYSE, AMEX, and Nasdaq stocks. SMB is the difference between average returns on three small-stock portfolios and three big-stock portfolios. HML is the difference between the average returns on two high–book equity/market equity portfolios and two low–book equity/market equity portfolios. Fama and French (1996) provide a detailed discussion of MKT, SMB, and HML. GRS is the F-statistic of Gibbons et al. (1989) which tests the hypothesis that the regression intercepts for a set of portfolios are jointly equal to zero. t-statistics are in parentheses.

Panel A: Eleven NYSE Portfolios Formed on Dividend Yield

	Dividend Yield Portfolios										
	Zero	Low	2	3	4	5	6	7	8	9	High
Intercept	−0.355	0.141	0.045	0.006	−0.040	0.023	0.166	0.207	0.165	0.116	0.174
	(−3.46)	(1.82)	(0.71)	(0.10)	(−0.59)	(0.32)	(2.46)	(2.86)	(2.37)	(1.20)	(1.25)

GRS F-statistic = 3.70 (p-value = 0.000).

Panel B: Twenty NYSE Portfolios Formed on Dividend Yield and Size

	Dividend Yield Portfolios				
	Zero	Low	2	3	High
Size			Intercept: α		
Small	−0.369	−0.105	−0.009	0.347	0.326
	(−2.65)	(−0.71)	(−0.07)	(2.98)	(2.50)
2	−0.479	−0.031	0.035	0.272	0.241
	(−3.70)	(−0.34)	(0.39)	(3.31)	(2.27)
3	−0.400	0.124	0.0001	0.124	0.095
	(−2.53)	(1.49)	(0.001)	(1.55)	(0.88)
Big	0.242	0.107	−0.075	0.059	0.023
	(1.07)	(1.73)	(−1.09)	(0.82)	(0.21)

GRS F-statistic = 3.38 (p-value = 0.000).

estimates are given in Table VII. Consistent with underperformance by recent stock issuers, virtually every intercept in Table VII is higher than the corresponding intercepts reported in Tables III and IV. Our previously reported dividend yield patterns, however, persist. In particular, the zero-yield stock intercept is -0.355 percent with a t-statistic of -3.46, and the intercepts of the five highest yield portfolios are higher than the intercepts of the five lowest yield portfolios. Similarly, the yield effect appears to be strong and fairly monotonic for the below median sized NYSE firms, but there is no discernible yield effect for the largest quartile NYSE firms. As before, for both the dividend yield sorted and the double sorted yield/size portfolios, the GRS F-statistics strongly reject the null hypothesis that all intercepts equal zero at conventional significance levels with p-values below 0.0001.

A second concern is that the yield effect proxies for earnings-to-price effects (E/P), book-to-market effects (B/M), cash-flow-to-price effects (CF/P), and five-year sales-growth-rank effects. As previously noted, Fama and French (1996) document that these return effects disappear with the introduction of the Fama–French risk factors. These same risk factors do not eliminate our yield effects. One possibility is that our sample differs from Fama and French's sample. In other words, our results may be sample specific, and other "value versus growth" effects may be present given *our* sampling criteria.

To investigate this hypothesis, similar to Fama and French (1996), each year we create ten single-sorted portfolios based on B/M, CF/P, E/P, and five-year sales-growth-rank that also meet our sampling criteria. For example, if the sorting variable is E/P, a stock is assigned to an E/P portfolio if the stock meets our dividend sampling criteria and if data are available to construct E/P. These portfolios differ from Fama and French's (1996) portfolios in two ways. First, some observations are included that Fama and French exclude. Fama and French require that a stock have data on *all* portfolio formation variables (i.e., B/M, CF/P, E/P and five-year sales-growth-rank) to be included in tests for a given year. This restriction eliminates many stocks in a given year that may have data available to construct B/M, CF/P, E/P, but do not have the six past years of sales data required to calculate the five-year sales-growth-rank variable. Second, some observations that are in Fama and French's portfolios are not present in our portfolios because they do not meet our dividend sample screens.

For each set of sorted portfolios, we estimate Fama and French regressions (equation (3)) and calculate GRS F-statistics to test the null hypothesis that all ten intercepts are equal to zero. Similar to Fama and French (1996), for each of the portfolio groups, we cannot reject the null hypothesis that all ten intercepts are equal to zero at conventional significance levels. No GRS F-statistic has a p-value less than 0.358.[20] Consequently, our dividend yield effect is not a proxy for previously documented B/M, CF/P, E/P, or sales-growth-rank effects.

[20] These results are available on request from the authors.

B. Is the Yield Effect Related to Taxes?

Though the dividend yield effects documented in the prior section appear too large to be entirely due to taxes, it is possible that some of the effect might be attributable to taxes. To investigate this possibility, we examine whether the yield effect is strongest during time periods where there is "higher" relative taxation of dividend income.

As a proxy for the tax environment, we use the implied tax rate from the municipal bond market. Poterba (1986, 1989) has documented that the implied tax rate series is sensitive to changes in the tax environment. The implied tax rate is the tax rate an investor would have to face to be indifferent between taxable and nontaxable bonds. We use the series as a proxy for the difference in taxation between holding taxable dividends and capital gains. Because interest income and dividend income are both taxed as ordinary income, one might expect under the tax-effect hypothesis that the bond market's implied tax rate would approximate the marginal tax rate on dividend income. Furthermore, if capital gains income largely escapes taxation due to the ability to defer the realization of gains, then the bond market's implied tax rate becomes a good proxy for the tax differential between dividend income and capital gains income. For instance, in Brennan's (1972) CAPM model with personal taxes, under a zero capital gains assumption, the implied tax rate from the bond market would be an excellent proxy for tax differentials, because the tax rate on dividend and interest income would be identical for most investors and the extra compensation required for holding higher yield stocks is a weighted average of individual tax rates.

We measure the implied tax rate using data from Salomon Brother's *Analytical Record of Yields and Yield Spreads*. We infer the implied tax rate, TAX, from the ratio of the one-year prime grade municipal yield to the one-year T-bill yield. The one-year rate is a good measure of the current implied tax rate, because it is based on one-year fixed-income securities and is not very likely to have large random fluctuation due to changes in the relative default spread between municipal and U.S. Treasury securities. The mean for the implied tax rate series, TAX_t, over our sample period is 0.387 with a standard deviation of 0.089 and an autocorrelation coefficient of 0.908.

Using nonlinear SUR techniques, we separately estimate each of the following models to assess the tax component of the dividend yield effect:

$$R_{pt} = \lambda_0 + \beta_{1p}[MKT_t + \lambda_1^*] + \beta_{2p}[SMB_t + \lambda_2^*] + \beta_{3p}[HML_t + \lambda_3^*] + \lambda_4 d_{pt-1} + \lambda_5(TAX_t \cdot d_{pt-1}) + e_{pt} \qquad (10)$$

$$R_{pt} = \lambda_0 + \sum_{i=1}^{3} (\delta_{ip} + (\theta_{ip} d_{pt-1}))[F_{it} + \lambda_i^*] + \lambda_4 d_{pt-1} + \lambda_5(TAX_t \cdot d_{pt-1}) + e_{pt}. \qquad (11)$$

The two systems of equations above are similar to our earlier models given in equations (7) and (9). The difference with the earlier models is that we now interact the dividend yield with the implied tax rate estimate from the one-year fixed income market. If the yield effect is a pure tax effect and the implied tax rate proxies perfectly for the relative tax differential between dividends and capital gains, then we expect $\lambda_4 = 0$ and $\lambda_5 = 1$. Because the effects we have documented appear too large to be pure tax effects and because the implied tax rate is likely to be an imperfect proxy for the relative tax differential, it is unlikely we will find $\lambda_4 = 0$ and $\lambda_5 = 1$. On the other hand, a coefficient estimate of λ_5 that is positive and significantly different from zero would be highly suggestive of some tax effect.

Results from the estimation of equations (10) and (11) are reported in Table VIII. With or without allowances for time-varying risk factor sensitivities, we cannot reject the hypothesis that $\lambda_5 = 0$, though it should be noted that the standard error of the estimate is exceedingly high. In other words, it is difficult to fashion a powerful test of the tax effect hypothesis due to the high correlation between the yield variable and the yield-implied tax rate interactive variable. Although not reported in Table VIII, we get similar results when we estimate equations (10) and (11) with the premium restriction $\lambda_1^* = \lambda_2^* = \lambda_3^* = 0$.

The preceding evidence is similar to that of Christie and Huang (1994) who examine return/yield sensitivities in particular years where the differences in top statutory rates between dividends and capital gains appear to be the largest. They find no evidence that the yield effect is the strongest in those years. Although differences in top statutory rates might not map perfectly into market capitalized tax effects, for completeness we also investigate this approach. Redefining TAX as $(t_d - t_g)/(1 - t_g)$, where t_d = the top statutory tax rate on ordinary income and t_g = the top statutory tax rate on capital gain income, we reestimate equations (10) and (11). Again, we find a positive yield effect that is unrelated to the level of the tax parameter.

The results in Table VIII provide no evidence of tax effects, but an alternative method to explore whether taxes matter is to examine the performance of the high and low yield portfolios with respect to shocks in the implied tax rate series. Poterba (1986, 1989) demonstrates that shifts in implied tax rates appear to occur when tax law changes are rumored or implemented. Furthermore, even absent a tax law change, the demand and supply of high and low taxed financial instruments can change unexpectedly in a way that changes the implied tax rate and the prices of high versus low taxed securities (see, e.g., Skelton (1983) and Buser and Hess (1986)). Like taxable bonds, high dividend yield securities generate large amounts of taxable income, so these stocks should perform poorly (relative to "lower taxed" capital gain stocks) when implied tax rates rise unexpectedly. This, of course, presumes that firms find it costly to adjust their dividend policies and that a tax effect exists.

Table VIII

Implied Taxes and Dividend Yields—Nonlinear Seemingly Unrelated Regressions

These data are for NYSE firms during the period July 1963 to December 1994 (378 months). Estimates of the risk premia and yield parameters are obtained by estimating each of the twenty dividend yield and size formed portfolios simultaneously using iterated nonlinear seemingly unrelated regression procedures. For the yield interaction with implied tax results, we estimate the system of equations (vi) below. For the yield interaction with implied taxes *and* risk measure results, the system of equations (vii) is estimated.

$$R_{pt} = \lambda_0 + \beta_{1p}[MKT_t + \lambda_1^*] + \beta_{2p}[SMB_t + \lambda_2^*] + \beta_{3p}[HML_t + \lambda_3^*] + \lambda_4 d_{pt-1} + \lambda_5(TAX_t \cdot d_{pt-1}) + e_{pt} \quad \text{(vi)}$$

$$R_{pt} = \lambda_0 + \sum_{i=1}^{3} (\delta_{ip} + (\theta_{ip} d_{pt-1}))[F_{it} + \lambda_i^*] + \lambda_4 d_{pt-1} + \lambda_5(TAX_t \cdot d_{pt-1}) + e_{pt}, \quad \text{(vii)}$$

where R_{pt} is the return on portfolio p in excess of the one-month Treasury bill return from CRSP. MKT (F_1) is the excess return on the CRSP value-weighted portfolio of NYSE, AMEX, and Nasdaq stocks. SMB (F_2) is the difference between average returns on three small-stock portfolios and three big-stock portfolios. HML (F_3) is the difference between the average returns on two high–book equity/market equity portfolios and two low–book equity/market equity portfolios. Fama and French (1996) provide a detailed discussion of MKT, SMB, and HML. d_{pt-1} (YLD) is the equally weighted dividend yield of stocks in portfolio p minus the market dividend yield. TAX is the monthly implied tax rate derived from monthly one-year prime grade municipal bond yields and monthly one-year Treasury bill yields. $\lambda_i^* = \lambda_i - E(F_{it})$, where λ_i is the risk premium associated with the ith factor. t-statistics from heteroskedastic-consistent (Robust-White) standard errors are in parentheses.

	Dividend Yield and Size Formed Portfolios					
Yield Interaction	Intercept: λ_0	MKT: λ_1^*	SMB: λ_2^*	HML: λ_3^*	YLD: λ_4	TAX(YLD: λ_5
With implied taxes	0.411	−0.353	0.242	−0.851	1.785	−0.103
	(0.886)	(−0.790)	(3.153)	(−5.728)	(1.593)	(−0.045)
With implied taxes and varying betas	0.033	0.007	0.174	−0.769	1.659	0.225
	(0.094)	(0.022)	(2.300)	(−4.641)	(1.819)	(0.113)

In order to capture the tax shocks from the implied tax rates, we estimate various regression and ARIMA models and use the residuals from these models as proxies for unanticipated tax rate shocks.[21] We then interact the tax rate shocks with the dividend yield measure and add this explanatory variable to our previous regression specifications in equations (10) and (11). The coefficient of the interaction of the tax rate shock and yield should be negative if higher yielding stocks perform more poorly (better) when implied tax rates go up (down). We find no support for a relation between shocks to the implied tax rate and return differences between high and low yield stocks. In particular, the coefficient of the shock interaction variable is insignificantly different from zero in all the regression specifications. Furthermore, the introduction of the tax shock variable has little effect on the other previously estimated coefficients.[22]

IV. Conclusion

In this paper, we construct a current, ex ante measure of long-run taxable dividend yield and demonstrate that returns are positively related to that yield. This holds true even after making risk adjustments based on the Fama–French factors and macroeconomic risk factors from the asset pricing literature. Although it is difficult to assign the observed yield effect to inadequate risk adjustment, we cannot attribute it to any previously documented asset pricing anomalies, and its sheer magnitude is difficult to attribute to tax effects. Using implied tax rates from the bond market, we find that the size of the yield effect appears to be unrelated to the level of the implied tax rate, and hence the potential tax penalty from receiving taxable dividend income. We also examine shocks to the implied tax rate series. To the extent that it is costly for high yield firms to adjust their dividend policy, we would expect that an unanticipated increase in the implied tax rate would lead to worse performance for higher yielding stocks. We find no such result. Consequently, it is difficult to attribute our documented yield effects to tax effects. Further casting doubt on the tax-effect story is the fact that the yield effect does not exist for the largest NYSE stocks and appears to be nonlinear with disproportionately poor returns for zero-yield stocks.

[21] The details are omitted for brevity, but these results are available on request from the authors.

[22] As additional checks on our results, we also experiment with alternative specifications for time variation of the dividend yield effect. For instance, Keim (1985) reports that there is a January seasonal in yield effects and Eades, Hess, and Kim (1994) report that ex-dividend day returns on high yield stocks can be partly explained by the level of T-bill rates. To control for these effects, we add two variables that we interact with the dividend yield measure: a January dummy and the yield on the 30-day T-bill at time $t - 1$. The results, not reported here, indicate that none of the coefficients on these additional interaction variables are significant at the 5 percent, and their presence does not appreciably change the tax coefficients.

What then are we observing? It appears we are left with the usual suspects: misspecified asset pricing models that result in yields proxying for omitted risk factors and/or some sort of market inefficiency with respect to yields. The fact that the yield effect predominates among smaller companies is potentially consistent with a market mispricing scenario. To the extent that mispricing of stocks occurs, it would be logical that it would exist among stocks where the transaction costs of arbitraging mispricing are highest. In any event, two conclusions do emerge from this study. First, a yield effect clearly exists. Second, we find no evidence that it is attributable to taxes.

Appendix

In deriving our dividend yield measures, we make a number of corrections to the 1994 CRSP tape. These are cataloged below.

1. To eliminate REITs, mutual funds, limited partnerships, and foreign corporations, we only use data for firms with a CRSP stock code of 10 or 11. However, because CRSP misclassifies some mutual funds and REITs as domestic corporations, we use a number of sources including *Barrons*, *Value Line*, *Standard & Poor's Stock Guide*, *Standard & Poor's Corporate Records*, and mutual fund directories to reclassify these firms.
2. The 1994 CRSP tape does not distinguish between taxable dividends (coded 1232, 1239) and nontaxable dividends (coded 1234) for many companies after 1985. Therefore, we check the *Capital Change Reporter* to find all cases of 1232s misclassified as 1234s. We find 121 such distributions for firms classified as corporations.
3. A large number of CRSP dividend categorizations are listed as 1212 and 1214 when they are in fact better characterized as 1232 or 1234. This is particularly true prior to 1963. For all firms listed as 10 or 11, we print out a list of all 1212s and 1214s. Using the following algorithm, we change 1212s to 1232s and 1214s to 1234s if:
   (a) The *Wall Street Journal Abstract* characterizes the dividend as a quarterly dividend.

   or

   (b) The dividend is preceded by another quarterly dividend two to four months earlier (based on either the declaration or payment date) and the 1212 dividend was either the same level of that quarterly dividend or was reported to have been changed from its prior level to the new level in the *Wall Street Journal Abstracts*, *Barrons*, or the *Standard & Poor's Corporation Records*.

   or

   (c) If there is no dividend classified as a quarterly dividend in the past two to four months then the dividend is classified as a quarterly dividend if it is followed by another dividend that is at the same level or it is reported in the *Wall Street Journal Abstracts*, *Barrons*, or the *Standard & Poor's Corporation Records* that the dividend rate is being boosted from its prior rate.

Criteria (b) and (c) are to ensure that the firm is viewed as having a normal rate. In other words, if a firm's current dividend differs from the prior dividend, but the financial press merely reports that the firm declared this new level with no reference to the prior level, this suggests that the new dividend level is probably not indicative of a change in an established dividend policy.

4. The final correction involves firms with an ex-dividend date before July 1963. The 1994 CRSP tape has assigned all such firms with a declaration date equal to the prior dividend distributions payment date. We use the 1987 CRSP tape to assign the correct declaration date for these firms.[23]

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[23] Fortunately, from our investigation, we find that the 1987 tape correctly assigns the declaration date. We have contacted CRSP regarding this problem.

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