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Earnings and Expected Returns

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ABSTRACT

The aggregate dividend payout ratio forecasts excess returns on both stocks and corporate bonds in postwar U.S. data. High dividends forecast high returns. High earnings forecast low returns. The correlation of earnings with business conditions gives them predictive power for returns; they contain information about future returns that is not captured by other variables. Dividends and earnings contribute substantial explanatory power at short horizons. For forecasting long-horizon returns, however, only (scaled) stock prices matter. Forecasts of low long-horizon stock returns in the mid-1990s are caused not by earnings or dividends, but by high stock prices.

In the mid-1990s, the dividend yield on the Standard & Poor's (S&P) Composite Index fell to its lowest level ever. The earnings yield (the inverse of the price earnings ratio), while low, was not exceptionally low. These two scaled price variables are often used to predict future stock returns. Given these two conflicting signals, what is the best way to forecast returns in the mid-1990s? For example, should one use the dividend yield's extremely low forecast of returns, or the earnings yield's more mild forecast?

Shiller (1984) and Fama and French (1988) estimate regressions of returns on *either* the lagged dividend yield or the lagged earnings yield, and find that both have explanatory power, but that the dividend yield has more. Fama and French (1988) explain these results: "Earnings are more variable than dividends. . . . If this higher variability is unrelated to the variation in expected returns, E/P is a noisier measure of expected returns than D/P." In contrast, this paper finds that the higher variability of earnings is not noise but actually is related to expected returns.

Looking at multivariate instead of univariate regressions, it turns out that the mid-1990s constellation of prices, dividends, and earnings produces even lower forecasts of future stock returns than the dividend yield alone. The

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reason for this surprising result is that the dividend payout ratio (the ratio of dividends to earnings) forecasts stock returns. This paper explores the dividend payout ratio's forecasting ability for asset returns for the period from 1947 to 1994.

Dividends and earnings are traditionally used to normalize stock prices. Different researchers use various normalizing variables, such as book value or multiyear backward moving averages of earnings. Usually, the important variable is thought to be the level of prices, which predicts future returns because stock prices are mean-reverting. The mean reversion is usually interpreted as due to rational time-varying discount rates, or due to irrational movements in prices. Instead, this paper considers the role of current earnings and dividends not as normalizing variables for price, but as predictive variables in their own right.

To preview the results, there are two reasons why the payout ratio forecasts returns. First, the payout ratio forecasts returns because the level of dividends forecasts returns. During this period, high dividends predict high future returns. One interpretation is that dividends measure the permanent component of stock prices, due to managerial behavior in setting dividends. Second, the payout ratio forecasts returns because the level of earnings forecasts returns. There is a clear story for this fact: the level of earnings is a good measure of current business conditions. Risk premia on stocks covary negatively with current economic activity: investors require high expected returns in recessions, and lower expected returns in booms. Since earnings vary with economic activity, current earnings predict future returns.

Thus, neither dividends nor earnings are harmless scaling variables when used to normalize the level of stock prices. Both contain information about future returns, above and beyond the information contained in the current level of stock prices. However, the information these two variables contain is chiefly about short-run variation in expected returns. Price is the only relevant variable for forecasting long-horizon returns.

This paper is organized as follows. Section I presents a simple framework for thinking about forecasting returns. Section II discusses the variables and their time series properties. Section III presents the basic results, using quarterly regressions for stock and bond returns. Section IV shows long-horizon results for stock returns, and explores the importance of various different variables. Section V presents conclusions.

I. Theoretical Framework

The dynamic dividend growth model of Campbell and Shiller (1988) is useful in interpreting forecasting regressions with stock returns on the left-hand side and a price variable on the right-hand side. Using a loglinear approximation to an accounting identity,

$$p_t = E_t \sum_{j=0}^{\infty} \rho^j [(1-\rho) d_{t+1+j} - r_{t+1+j}] + \kappa, \tag{1}$$

where p is log price, d is log dividends, r is rate of return, ρ is a discounting parameter less than one, and κ is an unimportant constant coming from the approximation. Define p_r as the discounted sum of future returns starting next period, and p_d as the discounted sum of future dividends starting this period:

$$p_{r,t} \equiv E_t\left[\sum_{j=1}^{\infty} \rho^j r_{t+1+j}\right] \qquad p_{d,t} \equiv E_t\left[\sum_{j=0}^{\infty} \rho^j (1-\rho) d_{t+1+j}\right]. \tag{2}$$

Equations (1) and (2) together imply that one can express one-period expected returns as:

$$E_t[r_{t+1}] = -p_t + p_{d,t} - p_{r,t} + \kappa. \tag{3}$$

Since returns are stationary, p_r is stationary. p_r is expected future returns, the mean-reverting component of stock prices. Assuming that the underlying asset's cash flows grow over time, p_d and p are nonstationary (and by definition share a common trend). p_d is the permanent component of stock prices.

Trying to literally estimate equation (3) is pointless, since it is just an accounting identity involving unobservable expectations. By definition, the coefficients on the variables are all one or negative one. But equation (3) can help in interpreting a forecasting regression of actual returns on lagged prices and proxies for lagged p_r and p_d. Since any proxy will be imperfect, and since the omitted variables p_r and p_d are highly correlated with p, in general the coefficients will not be equal to one or negative one.

One way to implement the regression is to put the difference between p and some measure of p_d on the right-hand side as a single variable, and so constrain the coefficients on the first two terms of equation (3). For example, if dividends follow a random walk, then $p_d = d$, and the dividend yield is placed on the right-hand side of the regression. This procedure has the advantages of parsimony and stationarity of the right-hand side variable. Putting the earnings yield on the right-hand side is another attempt at this constraint, using earnings as a measure of p_d. The standard interpretation of the poor results are that earnings are a poor measure of p_d, and thus the measurement error in the earnings yield pushes the coefficient toward zero.

Using dividend yields imposes the assumption that current dividends are a good measure of p_d. This is probably a good assumption using postwar U.S. data. As Lintner (1956) documents, most managers have a target level of dividends equal to a fraction of the "permanent" level of earnings. When the "permanent" level of earnings changes, managers slowly adjust their dividends toward the new target level.

However, this assumption might be a misleading guide to future returns, for we do not know why dividends are set this way. As Miller and Modigliani (1961) show, there are good reasons to believe dividend policy could be set in any arbitrary fashion. Thus, dividend policy and the usefulness of dividends in forecasting returns might not be stable. Previous research finds substantial changes in dividend setting behavior over time in the United States.[1] The usefulness of dividends in forecasting returns is weaker in prewar U.S. data and in other countries.[2]

Instead of subtracting a measure of p_d from p, another way to implement the regression is to normalize both p_d and p by some other variable. For any n, one can rewrite (3) as:

$$E_t[r_{t+1}] = -(p_t - n_t) + (p_{d,t} - n_t) - p_{r,t} + \kappa. \tag{4}$$

If n is such that $p - n$ is stationary, then all three variables on the right-hand side are stationary. This equation has the advantage that one can sort out the potentially different forecasting abilities of price and the measure of p_d.

In regressions with scaled price on the right-hand side, equation (4) shows there are two reasons why some nonprice variable might forecast returns. First, the variable might be correlated with permanent value, p_d. Second, the variable might be correlated with expected future returns, p_r. In interpreting why earnings have forecasting power for stock returns, I will argue in favor of this second reason.

II. Data

A. Construction of Variables and Summary Statistics

Stock returns, prices, dividends per share, and quarterly earnings per share all correspond to the Standard & Poor's (S&P) Composite Index, because historical quarterly earnings data for the index are available. Additional information on the variables is given in the Appendix.

Excess returns are total stock returns (continuously compounded including reinvested dividends) minus the return on a portfolio of treasury bills ($R_m - R_f$). Log price (p) is the natural logarithm of the S&P Composite Index. Log dividends (d) are the natural logarithm of the sum of the past four quarters of dividend per share. In contrast, for reasons discussed in Section III.A, log earnings (e) are the natural logarithm of a single quarter's earnings per share.

[1] Using annual data, Fama and French (1988) find that dividend-smoothing is greater and the speed of adjustment of dividends to earnings is lower in the period from 1957 to 1986, compared to the period from 1926 to 1956. Looking at annual S&P data, Barsky and De Long (1989) reject the hypothesis that the volatility of dividend growth was constant in the periods from 1880 to 1939 and 1940 to 1981.

[2] See Goetzmann and Jorion (1995) for evidence using U.S. and U.K. historical data, and Kothari and Shanken (1997) comparing the dividend yield with book-to-market in the prewar period.

Table I

Summary Statistics, 1947Q1–1994Q4

$R_{m,t+1} - R_{f,t+1}$ is quarterly log excess returns, calculated as total returns on the S&P Composite Index minus total returns on T-bills, as of the last day of quarter t. RREL_t is the relative bill rate, a stochastically detrended riskless rate. RREL is calculated as the current month's T-bill rate minus a moving average of the past 12 months' rate, as of the end of the quarter. d_t is the log of dividends per share paid out in the four quarters including quarter t. e_t is the log of earnings per share in quarter t. p_t is the log of the S&P price level. $e5_t$ is the log of the average of the past five years of annual earnings per share, calculated as the sum of the past twenty observations of quarterly earnings per share divided by five. $d_t - p_t$ is the log dividend yield, and $d_t - e_t$ is the log dividend payout ratio. $p_t - e5_t$, $d_t - e5_t$, and $e_t - e5_t$ are prices, dividends, and earnings normalized by five-year earnings.

	$R_{m,t} - R_{f,t}$	RREL_t	$d_t - p_t$	$d_t - e_t$	$p_t - e5_t$	$d_t - e5_t$	$e_t - e5_t$
Correlation Matrix							
$R_{m,t} - R_{f,t}$	1.00	−0.19	−0.05	0.14	0.07	0.07	−0.10
RREL_t	−0.19	1.00	−0.04	−0.37	0.03	−0.02	0.37
$d_t - p_t$	−0.05	−0.04	1.00	−0.23	−0.93	−0.01	0.23
$d_t - e_t$	0.14	−0.37	−0.23	1.00	0.33	0.30	−0.84
$p_t - e5_t$	0.07	0.03	−0.93	0.33	1.00	0.38	−0.12
$d_t - e5_t$	0.07	−0.02	−0.01	0.30	0.38	1.00	0.26
$e_t - e5_t$	−0.10	0.37	0.23	−0.84	−0.12	0.26	1.00
Univariate Summary Statistics							
Mean	0.016	0.002	−3.241	0.699	2.692	−0.549	−1.248
Standard deviation	0.075	0.012	0.268	0.191	0.290	0.106	0.188
Min	−0.311	−0.048	−3.623	0.313	2.068	−0.738	−2.074
Max	0.192	0.051	−2.597	1.565	3.137	−0.270	−0.701
Autocorrelation	0.11	0.27	0.95	0.68	0.96	0.98	0.68

The log dividend yield is $d - p$, the log earnings yield is $e - p$, and the log dividend payout ratio is $d - e$. To disentangle the different effects of prices, dividends, and earnings, I calculate log ratios of these three variables to a fourth variable, the five-year moving average of annual (nominal) earnings ($e5$). $e5$ is a normalizing variable that captures long-term movements in nominal economic variables, whereas e is this quarter's earnings. Table I shows basic summary statistics for the main series studied in this paper, and also presents correlations across series.

Table I also shows the relative rate on T-bills, RREL. The relative rate is the stochastically detrended riskless rate, calculated as the end-of-quarter T-bill rate minus its twelve-month backward moving average. The relative rate is used by Campbell (1991) and Hodrick (1992) to forecast stock returns.

Figure 1 shows the dividend payout ratio and the dividend yield. Figure 2 shows the ratios of prices, dividends, and quarterly earnings to five-year earnings, where all three series have been demeaned using the sample aver-

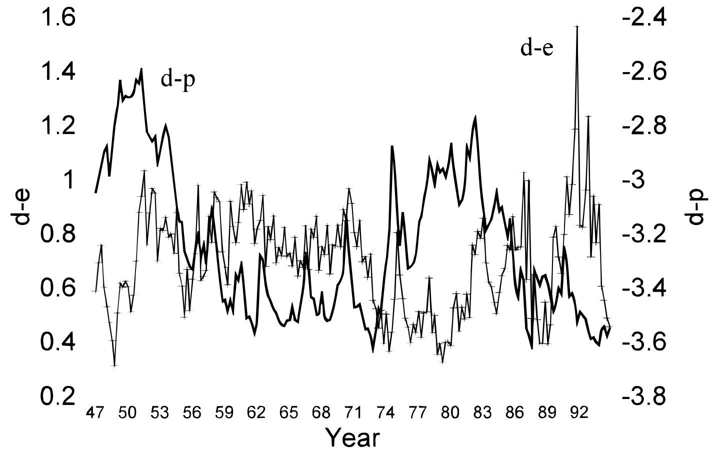

Figure 1. Payout ratio and dividend yield, 1947–1994. The solid line is $d - p$, the log dividend yield. The line marked with a "+" is $d - e$, the log dividend payout ratio.

age. The figures suggest that quarterly earnings are quite noisy, containing both small seasonal patterns and large spikes in the 1990s. The figures also show that earnings have a macroeconomic component, falling sharply in recessions.

One concern about using dividends to forecast returns is the possibility of a recent regime shift. Bagwell and Shoven (1989) show that repurchases greatly increase in the mid-1980s. If stock repurchases replace dividends, then the past history of dividend yields and payout ratios will be a misleading guide to future stock returns. Figures 1 and 2 do not suggest that repurchases lower dividends in the mid-1980s. If anything, the payout ratio rises around the mid-1980s. Of course, it is impossible to decisively reject the hypothesis of a regime shift using only a few years of data. Therefore, Section IV.B discusses forecasts of returns that do not depend on dividends.

The autocorrelation coefficient in Table I shows that the dividend yield is a highly persistent series. The high persistence of the dividend yield is due to high persistence in both dividends and prices, as shown by the autocorrelation of $d - e5$ and $p - e5$.[3] The next section examines the joint time series behavior of prices, dividends, and earnings.

B. Stationarity Tests for Prices, Dividends, and Earnings

Prices, dividends, and earnings are nonstationary because of nominal and real growth in the economy. Not surprisingly, standard unit root tests show that all three variables are I(1).

[3] Here and elsewhere, some caution should be used in interpreting the properties of quarterly $d - e5$, since d is the log of the sum of dividends over the course of four quarters. Using annual data, the autocorrelation coefficient of $d - e5$ is 0.84.

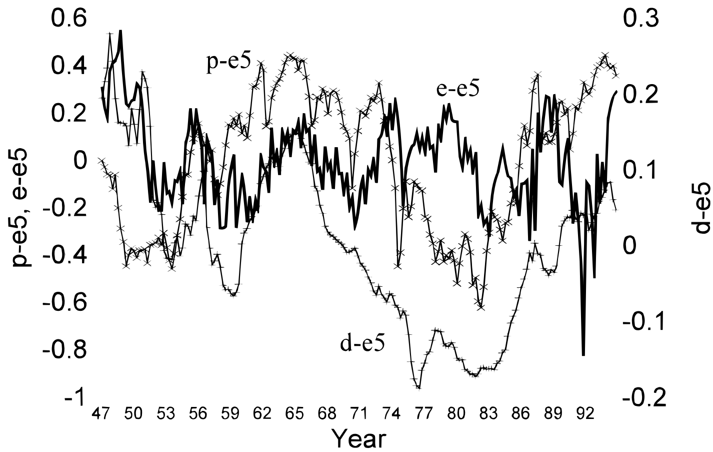

Figure 2. Scaled prices, dividends, and earnings, 1947–1994. The solid line is $e - e5$, the log ratio of quarterly earnings to five-year average earnings. The line marked with an "×" is $p - e5$, the log ratio of prices to five-year average earnings. The line marked with a "+" is $d - e5$, the log ratio of dividends to five-year average earnings. The sample average has been subtracted from all three series.

Table II shows bivariate cointegration tests for prices, dividends, and earnings. For each pair of variables, Panel A shows estimates of the cointegrating coefficient from univariate regressions of quarterly levels on levels. As in Froot and Obstfeld (1991), these regressions suggest that if dividends and prices are cointegrated, the coefficient is not one but instead implies prices moving more than dividends. The results for earnings and prices are similar, while the coefficients for dividends and earnings are much closer to one.

Panel B tests the alternative hypothesis that each pair of series is cointegrated with vector $(1, -1)$ against the null hypothesis of no cointegration. Froot and Obstfeld (1991), using a longer annual time series of U.S. data, are unable to reject the null hypothesis that dividends and prices are not cointegrated. Using similar unit root tests on the dividend yield, Table II is also unable to reject the null hypothesis of no cointegration for dividends and prices. These tests also find strong evidence that dividends and earnings are cointegrated, and marginal evidence for the cointegration of prices and earnings.

A more efficient way to test the hypothesis that any two variables are cointegrated with unitary coefficients is the Horvath and Watson (1995) test. This procedure tests the alternative of a known cointegrating vector against the null of no cointegration. Panel C of Table II shows bivariate Horvath–Watson tests, which produce strong evidence for cointegration of dividends and prices, and of dividends and earnings, and weak evidence for the cointegration of prices and earnings.

Instead of individually examining pairs of relationships, the Horvath and Watson (1995) test provides an informative way to test the joint hypothesis that all three variables are cointegrated with unitary coefficients. In this

Table II

Bivariate Cointegration Tests

This table shows estimated cointegrating coefficients, standard stationarity tests on log ratios, and the results of bivariate Horvath–Watson tests, 1947Q1–1994Q4. Panel A shows regressions of levels on levels. Panel B shows adjusted Dickey–Fuller (ADF) tests, and Panel C shows bivariate Horvath–Watson tests. Log prices (p), dividends (d), and earnings (e) are all proportional to an index of total return (including reinvested dividends) on the S&P Composite Index. There are 192 observations. For the ADF t-test, the critical values with 250 observations are: with no trend, (1 percent) −3.46, (5 percent) −2.88, and (10 percent) −2.57; with trend (1 percent) −3.99, (5 percent) −3.43, and (10 percent) −3.13. For the ADF ρ-test, the critical values with 250 observations are: with no trend, (1 percent) −20.3, (5 percent) −14.0, and (10 percent) −11.2; with trend, (1 percent) −28.4, (5 percent) −24.4, and (10 percent) −21.3. For the Horvath–Watson test, the critical values are (1 percent) 13.73, (5 percent) 10.18, and (10 percent) 7.3.

	Specification		Pair of Variables		
	Lags	Trend	d and p	d and e	e and p
Panel A: Regressions of Levels on Levels					
First variable regressed on second	Coefficient standard error	No	0.899 (0.011)	0.976 (0.010)	0.897 (0.017)
Second variable regressed on first	Coefficient standard error	No	1.080 (0.013)	1.004 (0.010)	1.047 (0.019)
Panel B: Adjusted Dickey–Fuller Tests					
t-test statistics	1	No	−2.20	−3.89[a]	−2.38
	1	Yes	−2.49	−3.91[b]	−2.43
	4	No	−1.89	−3.99[a]	−2.57
ρ-test statistics	1	No	−10.30	−31.76[a]	−11.38[c]
	1	Yes	−12.83	−32.06[a]	−12.13
	4	No	−8.53	−46.17[a]	−14.90[b]
Panel C: Horvath–Watson tests					
	1	No	17.73[a]	35.69[a]	6.51
	1	Yes	17.53[a]	39.20[a]	6.75
	4	No	11.68[b]	16.15[a]	8.27[c]

[a,b,c]Indicate significance at the 1 percent, 5 percent, and 10 percent levels.

context, the test statistic is identical to a Wald test for whether the error correction terms $d - p$ and $d - e$ (or any two pairs of these three variables) belong on the right-hand side of a vector autoregression (VAR) of Δp, Δd, and Δe. Table III shows this trivariate error-correction VAR, which resoundingly rejects the null hypothesis of no cointegration.[4]

[4] Using quarterly data, the test statistics are 55.64 (60.48 with trend) for a VAR with one lag, and 29.63 (32.78 with trend) with a VAR with four lags. Using annual data (including annual earnings instead of quarterly earnings) and a first order VAR, the test statistics are 35.14 (41.86 with trend). All these are well above the 1 percent critical value of 25.35 for a system with three variables, two known cointegrating relationships, and a null hypothesis of no cointegration.

Table III

Trivariate Cointegration Test

This table shows a first-order error-correction vector autoregression of the changes in log prices (Δp), log dividends (Δd), and log earnings (Δe) against their own lags, and lagged dividend yields ($d - p$) and dividend payout ratios ($d - e$). Log prices, dividends, and earnings are all proportional to an index of total return (including reinvested dividends) on the S&P Composite Index, 1947Q1–1994Q4. The Horvath–Watson statistic tests the alternative hypothesis that prices, dividends, and earnings are cointegrated with unitary coefficients, against the null hypothesis of no cointegration. The test statistic is an exclusion test for the dividend yield and dividend payout ratio in this vector autoregression. OLS standard errors are in parentheses below the coefficient estimates.

Dependent Variable	Constant	Δp_t	Δd_t	Δe_t	$d_t - p_t$	$d_t - e_t$	R^2
Δp_{t+1}	0.257	0.087	−0.275	−0.052	0.082	0.063	0.13
	(0.071)	(0.070)	(0.269)	(0.039)	(0.021)	(0.033)	
Δd_{t+1}	0.058	0.026	0.384	−0.013	0.004	−0.041	0.39
	(0.017)	(0.017)	(0.066)	(0.009)	(0.005)	(0.008)	
Δe_{t+1}	−0.095	0.133	−0.008	−0.364	−0.014	0.117	0.21
	(0.136)	(0.134)	(0.517)	(0.074)	(0.040)	(0.064)	

Horvath–Watson test for cointegration: 55.64 (p-value < 0.01).

The first row of Table III is a forecasting equation for stock returns. Since it is similar to the regressions presented in Section III (with the difference that Table III uses nominal returns (Δp) and includes more lagged terms), I defer discussion of the coefficients until then. The error-correction mechanism between dividends and earnings appears in the bottom two rows: when the payout ratio is high today, both dividends fall and earnings rise in the future.[5] In contrast, the dividend yield coefficients in the first two rows show that prices adjust to dividends, but dividends do not adjust to prices, as in Cochrane (1994). One interpretation of this fact is that dividends reflect the permanent component of value.

In summary, there are strong reasons from both theory and statistical tests to believe that prices, dividends, and earnings all share a common trend, so that ratios of any two of these variables are stationary.

III. Quarterly Forecasting Equations

A. Basic Forecasting Equations for Stocks

Table IV replicates the basic OLS regressions of Shiller (1984) and Fama and French (1988) using postwar quarterly data on excess returns, dividends, and earnings. The first two rows show that the dividend yield is

[5] Again, dividends are defined as the four-quarter sum, so some caution should be used in interpreting these regressions.

Table IV

Forecasting Quarterly Excess Return Using Dividend Yield, Earnings Yield, and Payout, 1947–1994

Regressions of current stock returns on lagged dividend yields, earnings yields, and dividend payout ratios, 1947Q1–1994Q4. The dependent variable, $R_{m,t+1} - R_{f,t+1}$, is quarterly log excess returns on the S&P Composite Index. $d_t - p_t$ is the log dividend yield, $e_t - p_t$ is the log earnings yield, and $d_t - e_t$ is the log dividend payout ratio. RREL_t is the relative bill rate. Forecast returns are the projected excess returns in 1995Q1, using 1994Q4 values of the regressors. Estimation error is the standard error of the point estimate, based on sampling error in the coefficients. Total forecast error includes both sampling error and residual variance. OLS standard errors are in parentheses below the coefficient estimates.

	Constant	$R_{m,t} - R_{f,t}$	RREL_t	$d_t - p_t$	$d_t - e_t$	$e_t - p_t$	R^2	Forecast Returns 1994Q4	
1	0.222			0.064			0.05	−0.004	Forecast
	(0.065)			(0.020)				(0.008)	Estimation error
								(0.074)	Total forecast error
2	0.062					0.012	0.00	0.015	Forecast
	(0.059)					(0.015)		(0.006)	Estimation error
								(0.076)	Total forecast error
3	0.207			0.194		−0.112	0.13	−0.037	Forecast
	(0.062)			(0.038)		(0.028)		(0.011)	Estimation error
								(0.072)	Total forecast error
4	0.207			0.083	0.112		0.13	−0.037	Forecast
	(0.062)			(0.020)	(0.028)			(0.011)	Estimation error
								(0.072)	Total forecast error
5	−0.042				0.083		0.04	−0.004	Forecast
	(0.020)				(0.028)			(0.009)	Estimation error
								(0.074)	Total forecast error
6	0.209	0.066	−0.892	0.078	0.086		0.15	−0.040	Forecast
	(0.062)	(0.069)	(0.465)	(0.020)	(0.030)			(0.011)	Estimation error
								(0.071)	Total forecast error

indeed a better univariate forecaster than the earnings yield. The dividend yield is significant and has more explanatory power than the earnings yield.[6]

Table IV also shows the one-quarter-ahead forecast excess returns produced by the regressions, using the 1994Q4 value of the explanatory variables.[7] The dividend yield produces a negative excess return forecast for 1995Q1. Not surprisingly given its poor forecasting ability, the earnings yield produces a positive excess return forecast of 1.5 percent, which is close to the sample average.

Table IV reports two types of standard errors for the forecast returns, corresponding to the uncertainty about the expected returns, and the uncertainty about realized returns. The first standard error reflects only estimation error from the estimated regression coefficients. It addresses the question: given the uncertainty about the regression parameters, how close is the forecast to the true expected return? The second standard error reflects both estimation error and residual variance. It addresses the question: how close will actual returns be to forecast returns?[8]

Another way to compare the forecasting power of the earnings and dividend yields is to put both in the same regression.[9] Row 3 of Table IV shows that including both yields, the results appear unexpected: the dividend yield is still positive and significant, but now the earnings yield is *negative* and significant. As a consequence, forecast returns are now -4 percent, which is significantly different from zero.

Row 3 says that conditional on the dividend yield, the earnings yield is negatively correlated with future returns. One way of restating this fact is that, conditional on the dividend yield, the dividend payout ratio $(d - e)$ is positively correlated with future returns. This numerically identical restatement is shown in row 4. Row 5 says that the payout ratio has forecasting power by itself.

Row 6 augments the quarterly regressions by adding the relative rate and the lagged dependent variable. Campbell (1991) and Hodrick (1992) find that the relative rate (a stochastically detrended short rate) subsumes other interest rate variables in forecasting equations for stock returns. Adding these variables decreases the coefficient on the payout ratio, although both the dividend yield and the payout ratio are still strongly significant. The relative rate is marginally significant, and negatively related to future stock returns.

[6] These regressions are somewhat unfair to the earnings yield because earnings have not been temporally aggregated (as is more standard). Such temporal aggregation would improve the univariate performance of the earnings yield in forecasting returns, although it would still be worse than the dividend yield.

[7] The 1994Q4 value of the log dividend yield is -3.55, and the log earnings yield is -4.01.

[8] Since Table IV simply presents static forecasts from a single regression, the corresponding variance is $x_0'[\sigma^2(X'X)^{-1}]x_0 + \sigma^2$, where X is the matrix of explanatory variables, σ^2 is the variance of the residual, and x_0 is the 1994Q4 row of data. The first term is the variance due to estimation error, while the entire term is the variance of the forecast error.

[9] Campbell and Shiller (1988) run annual excess return regressions with both E/P and D/P for 1871–1987, but only using a 30-year average of E.

Row 6 of Table IV shows one of the two benchmark regressions of the paper. I performed three robustness checks on this specification. First, should one use quarterly earnings or the more traditional four-quarter sum of earnings? Since e is not being used as a normalizing variable, there is no reason to impose temporal aggregation on it. The hypothesis that the traditional four-quarter earnings belongs in the regression can be tested by adding $d_t - e_{t-1}$, $d_t - e_{t-2}$, and $d_t - e_{t-3}$ to the regression. These three variables are jointly and individually insignificant, and do not substantially change the coefficient (and t-statistic) on $d_t - e_t$. Second, looking now at all the right-hand side variables jointly, one lag is sufficient in this regression. The Akaike and Schwarz criteria both indicate that a single lag is preferred. Last, e is a quarterly variable that is not seasonally adjusted. Adding seasonal dummies on the right-hand side of this equation does not change the results; the seasonal dummies are insignificant and the coefficient (and t-statistic) on $d - e$ does not change substantially.[10]

Table V replaces two variables with three, in order to sort out the different effects of the three variables of interest. It replaces dividend yields and payout ratios with normalized prices, dividends, and earnings. Table V is essentially an unconstrained version of Table IV, since prices, dividends, and earnings each have their own separate coefficient (in Table IV row 6, these three coefficients are implicitly constrained).

In row 1, all three variables are scaled by five-year average earnings. This regression is the second benchmark regression in this paper. The results are simple. First, high prices predict low future returns, with a coefficient of about -0.08. Second, high earnings also predict low future returns, with a coefficient of about -0.09. Last, high dividends forecast high future returns, with a coefficient of about 0.17.

The results show that the constraints imposed in row 6 of Table IV come at virtually no cost. No explanatory power is lost, and it is not difficult to satisfy the constraint that the coefficient on dividends equals the negative of the sum of the coefficients on earnings and prices. All three variables are individually significant, suggesting that dividends and earnings are not simply harmless variables that normalize price, but actually contain information.

These coefficients show why the earnings yield is such a dismal failure at univariate forecasting in Table IV. Prices and earnings both have the same negative relationship to future returns, so subtracting one from the other wipes out the relationship. In contrast, prices and dividends have the opposite relationship to future returns, so subtracting one from the other does not have such destructive consequences.

One concern about using five-year earnings as a normalizing variable is that changes in accounting practices or the changes in the effect of inflation on earnings make it an unreliable indicator of the common component of value. Rows 2, 3, and 4 of Table V show other ways to normalize, using

[10] As an additional robustness check, changing the sample period to 1952Q1–1994Q4 results in little change (except that the relative rate's t-statistic drops). Campbell (1991) suggests starting the sample in 1952 to accommodate changes in interest rate behavior.

Table V

Quarterly Forecasting Equations Using Prices, Dividends, and Earnings

Regressions of current stock returns on lagged returns, relative rates, dividend yields, dividend payout ratios, and scaled prices, dividends, and earnings. The dependent variable, $R_{m,t+1} - R_{f,t+1}$, is quarterly log excess returns on the S&P Composite. d_t is the log of dividends per share paid out in the four quarters including quarter t. e_t is the log of earnings per share in quarter t. p_t is the log of the S&P Price level. $d_t - p_t$ is the log dividend yield, and $d_t - e_t$ is the log dividend payout ratio. RREL_t is the relative bill rate. $e5_t$ is the log of the average of the past five years of annual earnings per share, calculated as the sum of the past twenty observations of quarterly earnings per share divided by 5. Ten-year inflation-adjusted earnings is log of the sum of the past forty observations of quarterly real earnings, divided by 10 and multiplied by the current CPI index. In rows 3 and 4, price, earnings, dividends, book value per share, and total sales all correspond to the S&P Industrials Index. Sales are four-quarter moving average, and book value is latest annual value. The sample is 47Q1–94Q4, except for row 4, which is 64Q1–94Q4. OLS standard errors are in parentheses below the coefficient estimates.

	Constant	$R_{m,t} - R_{f,t}$	RREL_t	$p_t - n_t$	$d_t - n_t$	$e_t - n_t$	R^2
	$n = e5$, five-year nominal earnings						
1	0.210	0.066	−0.894	−0.078	0.166	−0.085	0.15
	(0.068)	(0.069)	(0.470)	(0.020)	(0.056)	(0.032)	
	n = ten-year inflation-adjusted earnings						
2	0.209	0.066	−0.893	−0.078	0.164	−0.086	0.15
	(0.065)	(0.069)	(0.481)	(0.020)	(0.043)	(0.034)	
	n = Book value per share, S&P Industrials Index						
	(p, d, e also from S&P Industrials Index)						
3	0.199	0.063	−1.016	−0.065	0.136	−0.067	0.14
	(0.124)	(0.069)	(0.465)	(0.018)	(0.046)	(0.029)	
	n = Total sales on S&P Industrials Index						
	(p, d, e also from S&P Industrials Index, sample is 64Q1–94Q4)						
4	0.195	0.050	−0.845	−0.080	0.157	−0.085	0.13
	(0.196)	(0.090)	(0.549)	(0.032)	(0.065)	(0.039)	

variables that are likely to contain the same stochastic trend reflecting underlying growth of economic aggregates. Row 2 uses ratios of real prices, dividends, and earnings to the ten-year moving average of real earnings per share, a normalizing procedure used in Campbell and Shiller (1988).

Rows 3 and 4 use normalizing variables that, due to data limitations, correspond to the S&P Industrial Index. All four variables (price, dividends, earnings, and the normalizing variable) on the right-hand side come from the Industrials Index; for comparison the returns on the left-hand side (and the lagged returns on the right-hand side) are the usual returns from the S&P Composite Index.[11] Row 3 uses book value per share.[12] Row 4 uses

[11] The S&P Composite and the S&P Industrials indices naturally have very highly correlated returns. The correlation of the two dividend yields (using quarterly data, 1947–1994) and the correlation of the two returns series (using monthly data, 1976–1996) are both 0.99.

[12] S&P reports only annual book value, so the denominator is the latest value available at the end of the quarter.

four-quarter total sales per share, since the revenues of the firm are another variable that captures long-term movements in value. Sales data are only available starting in 1964.

The results in rows 2, 3, and 4 are very similar to the results in row 1. These regressions suggest that scaling issues do not matter in relating future returns to current prices, dividends, and earnings.

B. Interpreting the Results

I consider the interpretation of the price, dividends, and earnings coefficients. First, the negative coefficient on price is the familiar "discount rate" or "mean-reversion" effect usually measured by the dividend yield or book-to-market ratio. When required rates of return are high, (scaled) stock prices are low, so low prices today forecast high returns in the future. This component of stock market predictability has received the most attention.

Second, the current level of dividends measures the discounted value of future dividends during this period, and so is a proxy for p_d. The other normalizing variables used in Table V are also correlated with permanent value, but Lintner-style dividend-smoothing causes dividends to contain more information about future cash flows.

Last, the coefficient on earnings indicates that earnings are negatively correlated with expected returns. A variety of evidence suggests that expected returns have a macroeconomic component (Fama and French (1989), Chen (1991), Cochrane (1991)). Expected returns covary negatively with current macroeconomic activity: risk premia are high in recessions and low in expansions. It is also well known that current corporate earnings covary positively with macroeconomic activity (Lucas (1977) lists the cyclicality of profits as one of the seven main features of macroeconomic fluctuations). The story for earnings, then, is that they covary negatively with expected returns because earnings measure macroeconomic activity. An alternative explanation for the importance of earnings in these regressions is that they are correlated with future dividends, not expected future returns. According to this explanation, the negative coefficient on e is due to e's negative correlation with p_d.

Unfortunately for this explanation, the error correction relationship between dividends and earnings implies that the correlation of e and future dividends goes opposite the direction needed. The error correction relationship in Table III shows that when earnings are high, $d - e$ is low, and so either e falls or d rises or both. Thus the correlation of e and p_d is positive, not negative.

C. Other Assets

If the payout ratio is correlated with time-varying discount rates, one would expect it to forecast returns on all risky assets, including assets not having dividends or earnings.

Table VI

Forecasting Equations for Stocks and Bonds

Regressions of current stock and bond returns on lagged returns, relative rates, dividend yields, dividend payout ratios, and term and default spreads, 47Q1–94Q4. $R_{i,t+1} - R_{f,t+1}$ is quarterly log excess returns, calculated as the total returns on the relevant index minus total returns on T-bills, as of the last day of quarter t. d_t is the log of dividends per share paid out in the four quarters including quarter t. e_t is the log of earnings per share in quarter t. p_t is the log of the S&P Price level. $d_t - p_t$ is the log dividend yield and $d_t - e_t$ is the log dividend payout ratio. RREL_t is the relative bill rate. TERM is the difference between the long-term government bond yield and the T-bill yield. DEFAULT is the difference between the BAA and the AAA corporate bond rates. OLS standard errors are in parentheses below coefficient estimates.

Dependent Variable: $R_{i,t+1} - R_{f,t+1}$

Constant	$R_{i,t} - R_{f,t}$	RREL_t	$d_t - p_t$	$d_t - e_t$	TERM	DEFAULT	R^2
R_i = returns on S&P composite							
0.209	0.066	−0.892	0.078	0.086			0.15
(0.062)	(0.069)	(0.465)	(0.020)	(0.030)			
0.216	0.064	−0.128	0.087	0.093	0.889	0.397	0.17
(0.066)	(0.069)	(0.628)	(0.020)	(0.031)	(0.481)	(1.250)	
R_i = returns on small stocks							
0.220	−0.045	−1.795	0.075	0.067			0.09
(0.095)	(0.071)	(0.716)	(0.030)	(0.046)			
0.198	−0.050	−0.956	0.080	0.082	0.750	1.816	0.10
(0.102)	(0.071)	(0.969)	(0.032)	(0.047)	(0.742)	(1.930)	
R_i = returns on AAA corporate bonds							
0.046	−0.013	0.026	0.020	0.026			0.03
(0.034)	(0.093)	(0.319)	(0.011)	(0.016)			
0.029	−0.065	0.816	0.026	0.040	0.843	1.656	0.10
(0.035)	(0.091)	(0.370)	(0.011)	(0.016)	(0.225)	(0.670)	
R_i = returns on BAA corporate bonds							
0.055	0.052	−0.197	0.021	0.022			0.04
(0.034)	(0.091)	(0.318)	(0.011)	(0.017)			
0.026	−0.062	0.680	0.027	0.040	0.993	2.362	0.16
(0.035)	(0.089)	(0.354)	(0.011)	(0.016)	(0.256)	(0.670)	
R_i = returns on low-grade corporate bonds							
0.083	0.029	−0.283	0.035	0.052			0.09
(0.038)	(0.079)	(0.312)	(0.012)	(0.018)			
0.060	−0.043	0.757	0.043	0.071	1.085	2.172	0.19
(0.038)	(0.076)	(0.373)	(0.012)	(0.018)	(0.284)	(0.732)	

Table VI explores the ability of the payout ratio to forecast returns on corporate bonds and small stocks, and also shows the effect of two interest rate variables studied by Fama and French (1989). The term spread is the difference between the long-term Treasury bond yield and the 1-month Treasury bill rate. The default spread is the difference between the BAA and AAA corporate bond yields.

The second row of Table VI shows that including term and default spreads in the basic forecasting regression for stock returns has little effect on the coefficients on the dividend yield and payout ratio. The three interest rate variables are individually insignificant, and jointly only marginally significant (at $p = 0.07$). The next two rows show that the results are similar for returns on a portfolio of small stocks, although small stock regressions have higher standard errors on the payout ratio coefficient.

For corporate bond returns, the term and default spreads are (as one would expect from Fama and French (1989)) statistically significant and contribute substantial explanatory power. Without including term and default spreads, the dividend yield and payout ratio coefficients are small and less than two standard errors from zero for high grade bonds, and larger and strongly significant for low grade bonds. Including term and default spreads, the dividend yield and payout coefficients are a bit bigger, and are strongly significant for all bonds.

In summary, the payout ratio has forecasting power for corporate bond returns, and contains information not found in interest rate variables. These findings suggest that the payout ratio is correlated with time-varying expected rates of return.

IV. Long-horizon Forecasting

A. Vector Autoregression Results

Table VII shows the VAR counterpart to row 6 in Table IV. This system is the same as that of Campbell (1991) except that it adds the payout ratio. A first-order VAR seems to adequately capture the dynamics of the system. The Appendix reports additional information about the construction of the VAR system, including evidence on the importance of different lag lengths.

The table reports regressions for excess return, the relative rate, dividend yield, and dividend payout. The standard errors are heteroskedasticity consistent (and thus are different from the OLS standard errors reported in Table IV). As described in Campbell (1991) and Hodrick (1992), the estimated coefficients and covariance matrix of the residual terms can be used to calculate dynamic forecasts of long-horizon returns, the implied R^2 when regressing long-horizon returns against the right-hand side variables, and associated standard errors. The bottom of Table VII shows the implied long-horizon R^2.

The coefficients in the VAR and the pattern of implied R^2 are similar to those estimated by Campbell (1991). The dividend yield follows a highly persistent process, and Campbell (1991) shows that this persistence drives the long-term predictability of returns. Table VII shows that the payout ratio is a useful variable in this system, since it forecasts one-quarter-ahead relative rates and dividend yields in addition to returns.

Table VII also shows, for various horizons, the forecast excess returns for the period beginning in 1995. This shows the point estimate of the cumulative return one would earn over the entire period through buying stocks on

Table VII

Vector Autoregression (VAR) of Excess Returns, Dividend Yields, and Dividend Payout Ratios

Coefficients from a vector autoregression of returns, relative rates, dividends yields, and dividend payout ratios, 1947Q1–1994Q4. $R_{m,t} - R_{f,t}$ is quarterly log excess returns on the S&P Composite Index, $d_t - p_t$ is the log dividend yield, $d_t - e_t$ is the log dividend payout ratio, and RREL_t is the relative bill rate. The long-horizon implied R^2 are calculated using the estimated coefficient and covariance matrices of the VAR, and show the explanatory power of a regression of long-horizon returns on the lagged VAR variables. The forecast returns show the dynamic forecast of long-horizon returns, starting on the first day of 1995, given the estimated VAR and the variable values as of 1994Q4. Estimation error is the standard error of the point estimate, based on sampling error in the coefficients. Total forecast error includes both sampling error and residual variance. GMM standard errors are in parentheses below the coefficient estimates.

Dependent Variable	Constant	$R_{m,t} - R_{f,t}$	RREL_t	$d_t - p_t$	$d_t - e_t$	R^2
$R_{m,t+1} - R_{f,t+1}$	0.209	0.066	−0.892	0.078	0.086	0.15
	(0.055)	(0.068)	(0.578)	(0.017)	(0.035)	
RREL_{t+1}	−0.010	0.011	0.191	−0.007	−0.015	0.13
	(0.012)	(0.011)	(0.138)	(0.004)	(0.005)	
$d_{t+1} - p_{t+1}$	−0.112	−0.021	0.921	0.941	−0.119	0.93
	(0.059)	(0.070)	(0.571)	(0.018)	(0.036)	
$d_{t+1} - e_{t+1}$	0.197	−0.051	−1.900	−0.018	0.639	0.48
	(0.122)	(0.144)	(0.779)	(0.036)	(0.091)	

	1 Year	2 Year	3 Year	5 Year	10 Year
Long-horizon implied	0.30	0.41	0.51	0.63	0.66
R^2 for excess returns	(0.07)	(0.07)	(0.08)	(0.08)	(0.09)
Forecast returns, as of 1994Q4					
Forecast	−0.10	−0.10	−0.08	−0.01	0.22
Estimation error	(0.04)	(0.05)	(0.06)	(0.06)	(0.06)
Total forecast error	(0.14)	(0.18)	(0.20)	(0.21)	(0.26)

December 31, 1994, and shorting Treasury bills. The five-year forecast return, for example, shows that total stock returns over the period 1995 to 2000 are projected to be one percent less than total Treasury bill returns. For comparison, the unconditional mean excess return over a five-year horizon is 33 percent during the sample period. Again, the table shows two types of standard errors for the return forecasts: the standard error due only to estimation error, and the standard error based on the total forecast error.

Table VIII shows the VAR counterpart to row 1 in Table V, which normalizes prices, dividends, and earnings using five-year average earnings. The results are similar to Table VII. This quarter's earnings forecast next quarter's returns, prices, and relative rates. Both dividends and prices follow very persistent processes; relative rates and earnings are less persistent.

The forecasts of future returns are very similar for the two systems in Tables VII and VIII. Both forecast negative excess returns over the next few years, and returns far below average over the next ten years. At the

Table VIII

Vector Autoregression (VAR) of Excess Returns, Prices, Dividends, and Earnings

Coefficients from a vector autoregression of returns, relative rates, and scaled prices, dividends, and earnings, 1947Q1–1994Q4. $R_{m,t} - R_{f,t}$ is quarterly log excess returns on the S&P Composite Index, and RREL_t is the relative bill rate. $p_t - e5_t$, $d_t - e5_t$, and $e_t - e5_t$ are prices, dividends, and earnings normalized by five-year earnings. The long-horizon implied R^2 are calculated using the estimated coefficient and covariance matrices of the VAR, and show the explanatory power of a regression of long-horizon returns on the lagged VAR variables. The forecast returns show the dynamic forecast of long-horizon returns, starting on the first day of 1995, given the estimated VAR and the variable values as of 1994Q4. Estimation error is the standard error of the point estimate, based on sampling error in the coefficients. Total forecast error includes both sampling error and residual variance. GMM standard errors are in parentheses below the coefficient estimates.

Dependent Variable:	Constant	$R_{m,t} - R_{f,t}$	RREL_t	$p_t - e5_t$	$d_t - e5_t$	$e_t - e5_t$	R^2
$R_{m,t+1} - R_{f,t+1}$	0.210	0.066	−0.894	−0.078	0.166	−0.085	0.15
	(0.055)	(0.068)	(0.578)	(0.018)	(0.052)	(0.036)	
RREL_{t+1}	−0.005	0.011	0.181	0.007	−0.015	0.017	0.14
	(0.008)	(0.011)	(0.141)	(0.004)	(0.008)	(0.005)	
$p_{t+1} - e5_{t+1}$	0.015	0.044	−0.879	0.949	0.065	−0.128	0.94
	(0.056)	(0.070)	(0.561)	(0.018)	(0.053)	(0.038)	
$d_{t+1} - e5_{t+1}$	−0.045	0.016	−0.061	0.012	0.957	0.010	0.97
	(0.028)	(0.018)	(0.099)	(0.007)	(0.023)	(0.010)	
$e_{t+1} - e5_{t+1}$	−0.339	0.080	2.031	−0.012	0.205	0.615	0.50
	(0.139)	(0.134)	(0.779)	(0.034)	(0.105)	(0.094)	

	1 Year	2 Year	3 Year	5 Year	10 Year
Long-horizon implied	0.27	0.38	0.47	0.55	0.50
R^2 for excess returns	(0.07)	(0.10)	(0.12)	(0.14)	(0.13)
Forecast returns, as of 1994Q4					
Forecast	−0.09	−0.08	−0.04	0.06	0.34
Estimation error	(0.04)	(0.05)	(0.05)	(0.06)	(0.10)
Total forecast error	(0.14)	(0.18)	(0.20)	(0.23)	(0.31)

one-year horizon, these negative expected returns are more than two standard errors from zero.[13] The next section examines different versions of Table VIII's VAR.

B. Importance of Individual Variables

Table IX explores the effect of excluding various variables in Table VIII from the system. For each permutation, it shows the results from the first row of the VAR (the return equation), the one- and five-year horizon implied

[13] Kothari and Shanken (1997) examine the statistical reliability of such negative forecasts of excess returns.

Table IX

The Importance of Different Forecasting Variables

This table shows the first row (the return equation) from various vector autoregressions (VAR) of returns, relative rates, and scaled prices, dividends, and earnings, 1947Q1–1994Q4. The dependent variable, $R_{m,t+1} - R_{f,t+1}$, is quarterly log excess returns on the S&P Composite Index. RREL_t is the relative bill rate. $p_t - e5_t$, $d_t - e5_t$, and $e_t - e5_t$ are prices, dividends, and earnings normalized by five-year earnings. The long-horizon implied R^2 are calculated using the estimated coefficient and covariance matrices of the VAR, and show the explanatory power of a regression of long-horizon returns on the lagged VAR variables. The forecast returns show the dynamic forecast of long-horizon returns, starting on the first day of 1995, given the estimated VAR and the variable values as of 1994Q4. The standard errors reported for the forecasts are based on the total forecast error. GMM standard errors are in parentheses below the coefficient estimates.

								Implied R^2 for $R_{m,t} - R_{f,t}$		1994Q4 Forecast Returns	
	Constant	$R_{m,t} - R_{f,t}$	RREL_t	$p_t - e5_t$	$d_t - e5_t$	$e_t - e5_t$	R^2	1 yr	5 yr	1 yr	5 yr
1	0.210	0.066	−0.894	−0.078	0.166	−0.085	0.15	0.27	0.55	−0.09	0.06
	(0.055)	(0.068)	(0.578)	(0.018)	(0.052)	(0.036)		(0.07)	(0.14)	(0.14)	(0.23)
2	0.205	0.087		−0.084	0.183	−0.109	0.13	0.26	0.55	−0.08	0.05
	(0.056)	(0.072)		(0.018)	(0.051)	(0.034)		(0.07)	(0.13)	(0.14)	(0.23)
3	−0.006	0.053	−1.176		0.070	−0.050	0.08	0.08	0.04	0.02	0.29
	(0.037)	(0.070)	(0.610)		(0.050)	(0.034)		(0.06)	(0.06)	(0.16)	(0.40)
4	0.095	0.077	−1.129	−0.052		−0.049	0.11	0.21	0.54	−0.08	−0.00
	(0.058)	(0.069)	(0.604)	(0.017)		(0.030)		(0.06)	(0.10)	(0.15)	(0.23)
5	0.244	0.073	−1.387	−0.062	0.108		0.12	0.21	0.54	−0.03	0.05
	(0.054)	(0.069)	(0.573)	(0.017)	(0.043)			(0.07)	(0.16)	(0.15)	(0.23)
6	0.017	0.063	−1.456				0.06	0.03	0.01	0.04	0.30
	(0.006)	(0.071)	(0.593)					(0.02)	(0.00)	(0.16)	(0.39)
7	0.149	0.122		−0.050			0.05	0.15	0.51	−0.02	−0.01
	(0.047)	(0.077)		(0.017)				(0.04)	(0.07)	(0.15)	(0.25)
8	0.040	0.102			0.047		0.02	0.01	0.03	0.08	0.37
	(0.024)	(0.080)			(0.044)			(0.02)	(0.06)	(0.16)	(0.39)
9	−0.065	0.092				−0.064	0.04	0.04	0.01	0.02	0.27
	(0.038)	(0.077)				(0.030)		(0.04)	(0.02)	(0.16)	(0.40)

R^2 from the whole system, and the one- and five-year forecasted return starting in 1995 from the whole system.

The relative rate has a minor impact. It is statistically insignificant for multivariate forecasting, and dropping it results in virtually no decrease in one-year or five-year predictability.

In contrast, both dividends and earnings contribute substantial explanatory power at both the quarterly and annual frequency (rows 4 and 5 show that excluding either term reduces the implied annual R^2 from 0.27 to 0.21). However, neither contributes much to five-year predictability.

Only the price term is critical for predicting long-horizon returns, as one would expect from previous research. Omitting the price variable (row 3) causes the implied R^2 to plummet, and also produces much higher forecasts of future returns. The rows that contain price as a regressor uniformly produce negative expected returns at the one-year horizon, and approximately zero returns at the five-year horizon.

Rows 6 to 9 show forecasting regressions using only a lagged dependent variable and one other lagged variable. Earnings and the relative rate have short-term forecasting abilities but, again, price is clearly the only variable that matters in the long run. Row 7 shows that when all nonprice variables are excluded the long-term forecasting ability implied by the VAR is virtually untouched.

The last two columns show forecasts of returns starting in 1995, with the associated standard error based on total forecast error.[14] These allow one to inspect conditional forecasts of future returns based on different assumptions about structural changes in the economy. For example, one hypothesis is that corporations have made a permanent shift away from dividends and toward repurchases. Another possibility is that quarterly earnings have become more volatile in recent years, due to changes in accounting practices. Table IX says that these are essentially irrelevant issues for calculating long-horizon expected returns in the mid-1990s. Comparing row 1 to rows 4, 5, and 7 shows that dropping dividends or earnings from the equation has only a minor impact on five-year-ahead forecasts of returns.

What is the effect of using different normalizations for price? Row 7 shows that returns are forecasted to be -1 percent at the five-year horizon. Using different normalizing variables, instead of five-year average earnings, also results in fairly low forecasts of returns. Substituting the normalizing variables from rows 2 to 4 of Table V into row 7 of Table IX produces five-year forecasts of 11 percent (using inflation-adjusted earnings), -23 percent (using book value), and 8 percent (using sales). Although varied, all of these are low compared to the sample mean of 33 percent. For comparison, about 25 percent of the five-year excess returns were below 11 percent in the sample period, and the worst realization was -50 percent (which occurred in the period starting in 1969Q4).

[14] The standard errors based only on estimation error range from 0.02 to 0.04 for the one-year forecasts, and from 0.06 to 0.13 for the five-year forecasts.

Actual one-year excess returns in 1995 were 26 percent, far above their unconditional mean of 6 percent. Table IX allows the reader to compare out-of-sample performance for the different specifications. Row 1, for example, shows that the basic forecasting equation predicted a return of −9 percent, with a confidence interval of −37 percent to 19 percent, so the forecast error was unexpectedly large. Any regression with price performed poorly.

In summary, Table IX suggests that dividends and earnings are important, but only for forecasting short-term movements in expected returns. The relative rate is uniformly unimportant. For long-horizon returns, price is all that matters. Recent low forecasts of returns are due to the fact that stock prices are high.

V. Conclusions

The dividend payout ratio helps forecast returns because both dividends and earnings have separately identifiable forecasting ability. Neither one is a harmless variable when used to scale price. One interpretation is that dividends contain information about future returns because they help measure the value of future dividends, while earnings contain information because they are correlated with business conditions. Although one can regress returns on dividends, earnings, and prices as separate variables, the coefficients are such that nothing is lost by using a more parsimonious specification with only dividend yields and payout ratios.

Previous research has generally regarded quarterly earnings as noise that should be discarded or smoothed. What has previously been classified as noise is actually useful information about short-term movements in expected returns. Both high current prices and high current earnings forecast low future returns. Thus using earnings yields alone to forecast returns is a bad idea, not because earnings are noisy, but because they are informative. In contrast, high dividends forecast high future returns, so using dividend yields alone to forecast returns is more successful.

For forecasting long-run returns, however, normalization does not matter. Dividing price by any smooth accounting variable capturing nominal growth produces roughly the same forecasting variable. Dividends and earnings help predict short-term returns, but these variables are unimportant for forecasting long-term returns. In the mid-1990s, U.S. stock prices were high relative to any accounting benchmark. Low forecasted long-horizon returns in the mid-1990s are due to high prices, and nothing else.

Appendix

A. Data

All data on stock, bond, and bill returns come from Ibbotson Associates. Excess stock returns are $R_{m,t+1} - R_{f,t+1}$, defined as $\ln(\text{CSTIND}_{t+1}/\text{CSTIND}_t) - \ln(\text{USTIND}_{t+1}/\text{USTIND}_t)$, where CSTIND is an index of total return (including reinvested dividends) on the S&P Composite Index and USTIND is an index of total return on T-bills, as of the last day of quarter t. Excess returns for small stocks, AAA bonds, BAA bonds, and low grade bonds are calculated similarly.

The basic earnings and dividends data are from the *Security Price Index Record* published by Standard & Poor's Statistical Service. EPS is quarterly earnings per share, Adjusted to Index, Composite. DPS is 12-month moving total dividends per share, Adjusted to Index, Composite. Standard & Poor's report dividends and earnings indexed to their composite price index, SPLEVEL. $d_t - p_t$ is defined as ln(DPS/SPLEVEL), and is log dividend yield. $e_t - p_t$ equals ln(EPS/SPLEVEL) and is log earnings yield.

Tables II and III, in order to put d and e in the same units as p, adjust by the ratio of SPLEVEL (which is a capital appreciation index only) and CSTIND (which includes reinvested dividends). In those tables, d is ln(DPS $*$ CSTIND/SPLEVEL), e is ln(EPS $*$ CSTIND/SPLEVEL), and p is ln(CSTIND).

RREL is the stochastically detrended T-bill rate, as of the end of the month. For month t, i_t is $(\text{USTIND}_{t+1}/\text{USTIND}_t)^{12} - 1$. RREL_t is i_t minus the average of i from months $t - 12$ to $t - 1$. Quarterly RREL is the last observation at the end of the quarter.

Prices, dividends, earnings, and book value data for the S&P Industrials Index are from the *Security Price Index Record*. Revenues are from Data Resources, Inc. The long-term government yield used to calculate the term premium is from Ibbotson Associates. The BAA and AAA corporate rates are from Citibase.

B. VAR Statistics and Lag Lengths

In constructing the forecasts, implied R^2, and associated standard errors for the VAR, I follow exactly the procedures in Hodrick (1992). See that paper for more information. Here I outline the main elements of this approach and indicate slight differences.

The vector of variables follows a first-order VAR:

$$Z \equiv [R_{m,t} - R_{f,t} - E(R_{m,t} - R_{f,t}), RREL_t - E(RREL_t),$$

$$d_t - p_t - E(d_t - p_t), d_t - e_t - E(d_t - e_t)], \tag{A1}$$

$$Z_{t+1} = AZ_t + u_{t+1}. \tag{A2}$$

The k-step-ahead forecast of returns is the first element in the matrix:

$$E_t[Z_{t+k}] = A^k Z_t. \tag{A3}$$

Multiperiod returns are calculated by summing consecutive Z's. V is the covariance matrix of the u's. If $C(j)$ is the jth-order autocovariance of Z, then the variance of the k-period-ahead compounded return is the first element of

$$V_k = kC(0) + \sum_{j=1}^{k-1} (k-j)[C(j) + C(j)']. \tag{A4}$$

The innovation variance of the sum of k returns is $e1'W_k e1$, where $e1 = (1,0,0,0)$ and

$$W_k = \sum_{j=1}^{k} (I-A)^{-1}(I-A^j)V(I-A^j)'(I-A)^{-1\prime}. \tag{A5}$$

Thus the implied R^2 from the VAR is

$$R^2(k) = 1 - \frac{e1'W_k e1}{e1'V_k e1}. \tag{A6}$$

Following Hodrick (1992), I estimate the coefficients and residual covariance matrix using the general method of moments (GMM). The asymptotic standard errors are calculated using numerical derivatives. In constructing the GMM weighting matrix, I impose the constraint that the residuals are uncorrelated but allow for arbitrary correlation of the variance shocks for two quarterly lags (instead of Hodrick's six monthly lags).

The forecast error for total returns over the next M quarters is:

$$\begin{aligned}\sum_{k=1}^{M} Z_{t+k} - \sum_{k=1}^{M} \hat{Z}_{t+k} &= \sum_{k=1}^{M}\left[(A^k - \hat{A}^k)Z_t + \sum_{j=0}^{k-1} A^j u_{t+k-j}\right] \\ &= \sum_{k=1}^{M}[(A^k - \hat{A}^k)Z_t] + \sum_{k=1}^{M}\sum_{j=0}^{k-1} A^j u_{t+k-j}.\end{aligned} \tag{A7}$$

The variance of the first term is used to construct the estimation standard error, and the variance of the entire equation is used to construct the total forecast standard error.

C. Lag Lengths

Examining the individual OLS regressions in Table VII, where the variables are excess returns, the relative rate, the dividend yield, and the dividend payout ratio, the Akaike selection criterion selects (in order) 1, 2, 3, and 6 quarterly lags. The Schwarz criterion selects 1, 1, 1, and 2 quarterly

Table AI

Second Order Vector Autoregression (VAR) of Excess Returns, Relative Rates, Dividend Yields, and Dividend Payout Ratios

This table shows p-values for exclusion tests from a second-order vector autoregression of returns, relative rates, dividends yields, and dividend payout ratios, 1947Q1–1994Q4. $R_{m,t} - R_{f,t}$ is quarterly log excess returns on the S&P Composite Index, $d_t - p_t$ is the log dividend yield, $d_t - e_t$ is the log dividend payout ratio, and RREL_t is the relative bill rate. The long-horizon implied R^2 are calculated using the estimated coefficient and covariance matrices of the VAR, and show the explanatory power of a regression of long-horizon returns on the lagged VAR variables. Standard errors are in parentheses below the coefficient estimates.

	p-Values				
Dependent Variable	$R_{m,t} - R_{f,t}$	RREL_t	$d_t - p_t$	$d_t - e_t$	R^2
$R_{m,t+1} - R_{f,t+1}$	0.36	0.04	0.00	0.03	0.17
RREL_{t+1}	0.00	0.01	0.07	0.02	0.20
$d_{t+1} - p_{t+1}$	0.02	0.04	0.00	0.00	0.93
$d_{t+1} - e_{t+1}$	0.37	0.13	0.36	0.00	0.54
	1 Year	2 Year	3 Year	5 Year	10 Year
Long-horizon implied	0.32	0.42	0.49	0.59	0.59
R^2 for $R_{m,t+k} - R_{f,t+k}$	(0.09)	(0.12)	(0.13)	(0.14)	(0.16)

lags. Table AI shows p-values and implied R^2 for the second-order VAR. Since the Schwarz criterion selects one lag and the results in Table AI are so similar, for consistency the paper uses a first-order specification throughout.

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