Surprise! Higher Dividends = Higher Earnings Growth

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We investigate whether dividend policy, as observed in the payout ratio of the U.S. equity market portfolio, forecasts future aggregate earnings growth. The historical evidence strongly suggests that expected future earnings growth is fastest when current payout ratios are high and slowest when payout ratios are low. This relationship is not subsumed by other factors, such as simple mean reversion in earnings. Our evidence thus contradicts the views of many who believe that substantial reinvestment of retained earnings will fuel faster future earnings growth. Rather, it is consistent with anecdotal tales about managers signaling their earnings expectations through dividends or engaging, at times, in inefficient empire building. Our findings offer a challenge to market observers who see the low dividend payouts of recent times as a sign of strong future earnings to come.

Since 1995, and until a recent uptick arising from plunging earnings, marketwide dividend-payout ratios in the United States have been in the lowest historical decile, reaching unprecedented low levels from late 1999 to mid-2001. Alternatively stated, earnings-retention rates have recently been at or near all-time highs. Meanwhile, price-to-earnings ratios and price-to-dividend ratios are high by historical standards, despite the sharp fall in stock prices since early 2000. With recent valuation ratios at such high levels and dividend payouts so low, the only way future long-term equity returns are likely to rival historical norms is if future earnings growth is considerably faster than normal. Some market observers, including some leading Wall Street strategists, do indeed forecast exceptional long-term growth. As a cause for this optimism, they point to, among other things, the recent policies of low dividend-payout ratios.

Consider the well-known constant-growth valuation model of Gordon (1962):

$$R = \frac{D}{P} + G. \tag{1}$$

Expected return, R, equals the dividend yield, D/P, plus an assumed constant expected growth term, G. Now, the dividend yield itself can be thought of as the product of the dividend-payout ratio, D/E (the ratio of dividends to earnings), and the earnings yield, E/P (the inverse of P/E):

$$R = \left(\frac{D}{E}\right)\left(\frac{E}{P}\right) + G. \tag{2}$$

Equation 1 and Equation 2 can be applied to a given company or to the market portfolio itself. We focus on the latter application. Assuming dividend policy does not affect the expected return on the market portfolio (and assuming the payout ratio is constant through time, so earnings and dividend growth are equal), a low payout (D/E) must be offset either by a high E/P (low P/E) or by high expected growth.

As we will show, in the past 130 years, U.S. equity market P/Es have not offset variation in payout ratios. For instance, recent P/Es have been very high, whereas to offset today's low payout, they would have to be quite low. Thus, the task of offsetting the low payout is left to G, growth.

Some interpret this forecasted marketwide inverse relationship of current dividend-payout policy to future growth as an intertemporal extension of the Modigliani and Miller (1961) dividend irrelevance theorem.[1,2] For example, imagine an instantaneous pervasive change in dividend policy

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Note: *This article was accepted for publication prior to Mr. Arnott's appointment as editor of the* Financial Analysts Journal.

that permanently alters the market *D/E* from paying out 50 percent of earnings to paying out 25 percent of earnings. Because current earnings do not change (and, according to Miller and Modigliani, price should not change), the task of keeping expected return constant is again left to growth. For instance, suppose the market was selling for a P/E of 15 at the time of this change (about the historical average). Thus, *E/P* was 6.7 percent (1/15); 25 percent of 6.7 percent is 1.7 percent. In other words, in a market with a P/E of 15, for the market's expected return to be unaltered and current prices and earnings to remain unchanged, a permanent change in payout policy from 50 percent to 25 percent would have to be offset by a permanent increase in expected growth of 1.7 percent.

For a single company, this increase in growth is clearly possible—if the business is easily scalable or if offsetting transactions (e.g., share buybacks) are undertaken—and investment policy is unaffected. By similar reasoning, many observers would accordingly expect a strong and reliably negative relationship between payout ratios and future earnings growth for the market as a whole. Looking at the recent policy of low payouts, this view, if true, would offer grounds for optimism regarding future earnings growth.

Implicit in this view is a world of perfect capital markets. For instance, this reasoning assumes that investment policy is unaltered by the amount of dividends paid, that information is equal and shared (meaning the dividend does not convey managers' private information), that tax treatment is the same for retained or distributed earnings, that managers act in the best interests of the shareholders, that markets are priced efficiently, and so forth. When the assumption of perfection is relaxed, a host of behavioral or information-based hypotheses arise as potential explanations for how the market's payout ratio might relate to expected future earnings growth. Thus, we turned to the historical data to answer the question of how marketwide payout ratios have related to future earnings growth.[3]

Data

We used three sources of dividend yield and stock total-return data—Schwert (1990), Shiller (2000; updated data from aida.econ.yale.edu/~shiller/data.htm), and Ibbotson Associates (2001).[4] In calculating real earnings growth, we began with a calculation of real earnings for an index portfolio. We did so in the following steps:

1. constructing a total return index for stocks,
2. subtracting out the monthly dividend income on stocks, based on the data from Schwert, Shiller, and Ibbotson, which gave us a stock price index from 1871 to date,
3. dividing through by the U.S. Consumer Price Index (CPI) to impute a real stock price series, and
4. multiplying the real price series by the earnings-yield data from Shiller.[5]

This process generated a history of the EPS of the S&P 500 Index.

Because earnings and the forecasting of earnings growth is the crux of our article, more discussion of our definition of EPS is in order. We conduct tests of whether certain variables, notably the payout ratio, can be used to forecast the growth in the aggregate EPS number derived in Step 4. This aggregate EPS series is not the same as the earnings growth on a static portfolio of stocks. The economy at large is dynamic; a "market" portfolio must adjust to acknowledge this fact. By focusing on a portfolio that an investor might choose as a market portfolio, we were tacitly selling the companies that were no longer an important factor in the market or economy to make room for those that had become an important factor. Standard and Poor's does exactly the same by adding "new-economy" stocks (whatever the new economy is at each point in time), dropping "old-economy" stocks, and changing the divisor for the index. Changing the divisor each time the index composition is changed is equivalent to a pro rata sale of existing holdings to rebalance into new holdings. So, when we were examining 10-year real earnings growth (the forecasting horizon we primarily focused on), we were not looking at the growth of earnings on a fixed set of stocks bought at the outset. "Growth" in our approach is analogous to the growth an investor might have seen on the EPS of an index fund portfolio that held the assets selected by Standard and Poor's since 1926 (and by Cowles, retrospectively, from 1871 to 1925). It is the rate of growth in this index fund's EPS that we attempted to forecast in this study (and generally what we refer to as "earnings growth").

Another way to think about what we did is to recognize the distinction between the market and a specific index portfolio. The market, in aggregate, shows earnings and dividend growth wholly consistent with growth in the overall economy (Bernstein 2001a). If that same market portfolio were unitized, however, the unit values would not grow as fast as the total capitalization because of the dilution associated with new assets in the market portfolio (new companies in an index are almost always larger than the companies that they replace). Similarly, the "per share" earnings and dividends of an index fund portfolio (per "share" of the unitized index fund) will not keep pace with the growth in the aggregate dollar earnings and dividends of the companies that constitute the market. Why? Because when one stock is dropped and another added, the added stock is typically larger and more profitable than the deletion, which increases the divisor for constructing the index.

Precisely the same thing happens in the management of an actual index fund. When a stock is replaced, the proceeds from the deleted stock rarely suffice to fund the purchase of the added stock. Accordingly, all stocks are trimmed slightly to fund the new purchase—the implied consequence of the change in the divisor for an index. This mechanism drives a persistent wedge between, on the one hand, the growth of the aggregate dollar earnings and dividends for the market portfolio (which will keep pace with GDP growth over time) and, on the other hand, the per share growth of earnings and dividends for the market index (which will not keep pace with GDP growth—see Arnott and Bernstein 2002).

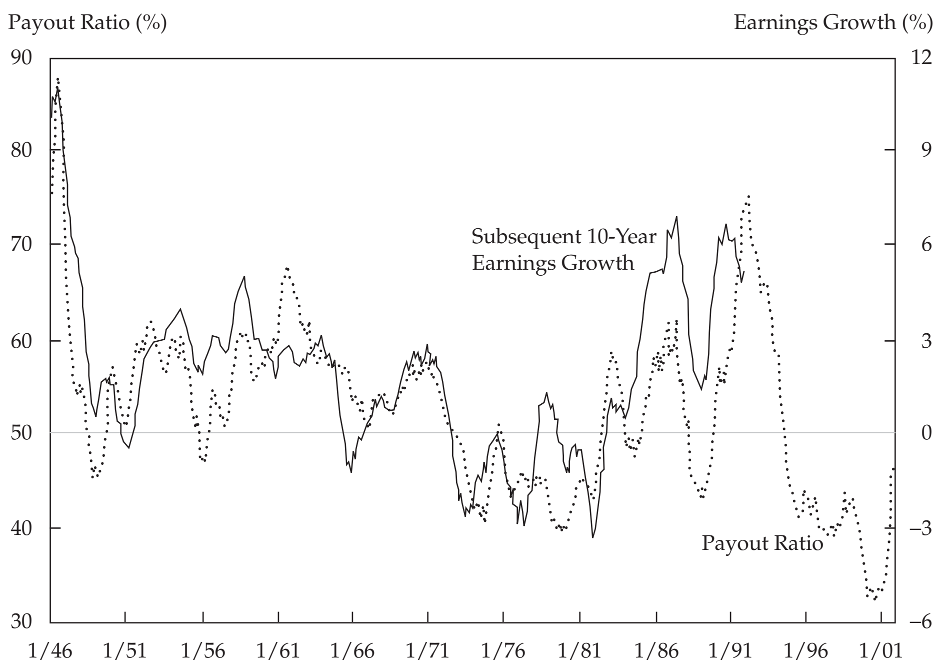
Entrepreneurial capitalism created the companies that we had to add to the market portfolio (or brought down those that had to be removed), thereby changing our divisor. Thus, a persistent difference exists between our measure of EPS and aggregate dollar earnings or GDP, with our EPS growing slower than aggregate dollar earnings or GDP growth over long periods. Differences in levels of growth ended up in the unexamined intercepts of our regressions, however, and only covariance of this differential with our *ex ante* predictive measures affected our tests (the robustness checks to follow provide some comfort that this issue is not important).

For some of our tests, we used both bond yields and the CPI. Our two sources of bond yields were the National Bureau of Economic Research (NBER) and Ibbotson Associates.[6] In cases of differences, we averaged the yield data. We used the same two sources for CPI data.[7] GDP data were drawn from the NBER.[8]

The Payout Ratio for Forecasting Earnings Growth

We defined the payout ratio in this study as last year's trailing dividends divided by last year's trailing earnings. Dividends are "sticky"; they tend not to fall in notional terms, although they can fall during severe earnings downturns and can fall in real terms during periods of high inflation. Because earnings are more volatile than dividends, payout ratios are relatively volatile, although they have been far less volatile since 1946 than before. **Figure 1** shows the payout ratio of the S&P 500 from 1946 through year-end 2001 and subsequent 10-year growth in real earnings. Note that the payout ratio

Figure 1. Payout Ratio and Subsequent 10-Year Earnings Growth, 1946–2001



falls to the lowest levels ever seen near the end of our sample period, before a recovery in late 2001, because of plunging current earnings.

This discussion will focus on 1946–2001 (the post-World War II period) as the "modern period," for which our confidence in data quality and applicability to current times are highest. The period before 1946 was one of two world wars, the Great Depression, unregulated markets, and a host of other differences from the post-1945 era. Where possible, however, we will also show results for earlier and longer periods.

Figure 1 shows empirically that forecasts of a natural inverse relationship between dividend payout and future earnings growth are not correct. **Figure 2**, which plots subsequent 10-year real earnings growth against starting payout ratios as a scatterplot, rejects this elegant thesis even more vividly. Obviously, rather than inverse, the relationship of current payout to future earnings growth is strongly positive. **Table 1** contains the monthly regression corresponding to Figure 1 of the rolling 10-year real earnings growth of the S&P 500 on the starting payout ratio, *PR*, for the past 50–130 years.[9] The link seen in the plots and regressions is compelling, particularly because it has the "wrong" sign.[10]

Examining our main 1946–2001 period another way, we divided all rolling 10-year periods starting in January 1946 and ending in December 1991 into four quartiles by starting payout ratio (Quartile 1 being the low payout ratio and Quartile 4, the high). **Table 2** reports the average 10-year earnings growth and the worst and best 10-year earnings growth achieved when starting in each respective payout-ratio quartile. The average earnings growth obviously increases with a rising starting payout ratio, which corresponds to the regression in Table 1 and scatterplot in Figure 2. We suspect that many readers will be surprised that starting in the bottom quartile of payout ratios, the average subsequent real earnings growth is actually negative. Needless to say, negative real earnings growth for a 10-year span falls far below what most investors would find acceptable, let alone expect *ex ante* one quarter of the time.

The worst and best 10-year spans also show the same monotonic relationship with the starting payout ratio: The higher the payout ratio, the better the average subsequent 10-year earnings growth and the better the best and the worse the worst outcomes. A striking example is that the worst 10-year growth when starting in the highest-payout-ratio quartile is better than the average earnings growth when starting in the lowest-payout-ratio quartile. Conversely, the best 10-year growth starting in the lowest-payout quartile is not as good as the average growth when starting in the highest-payout quartile.

In general, when starting from very low payout ratios, the equity market has delivered dismal

Figure 2. Scattergram of Payout Ratio vs. Subsequent 10-Year Real Earnings Growth, 1946–2001 Data

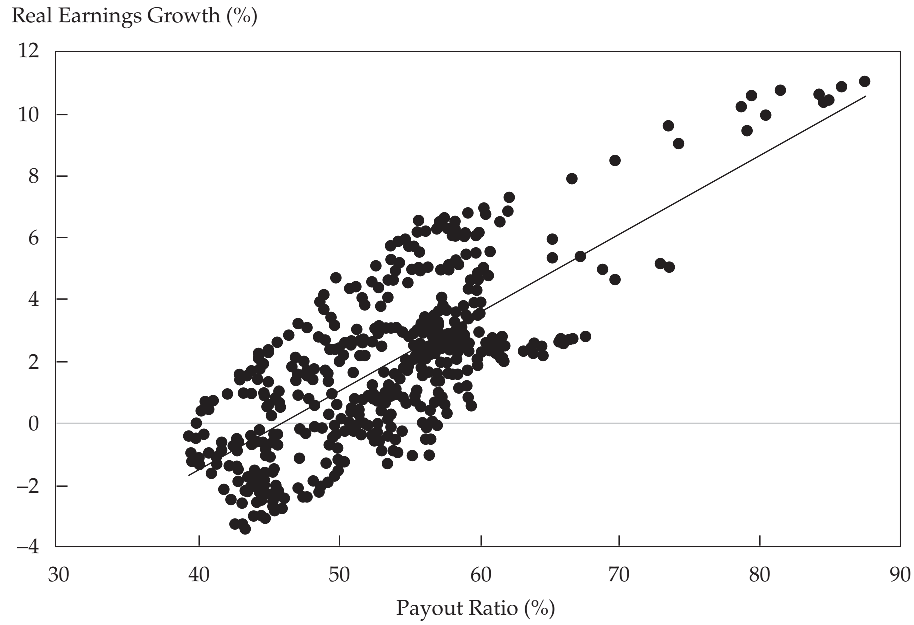


Table 1. Subsequent 10-Year Earnings Growth as a Function of Payout Ratio: Regression Coefficients (*t*-statistics in parentheses)

Regression Span	a	b	Adjusted R^2
1946–2001	–11.6%	0.25PR	54.6%
	(–7.2)	(8.6)	
1871–2001	–3.1	0.07PR	14.2
	(–3.1)	(4.5)	
1871–1945	–5.1	0.09PR	19.5
	(–4.4)	(7.5)	

Note: The regression equation is

$$\text{10-Year earnings growth} = \text{Constant term} + (b) \times \text{Preceding payout ratio, or}$$

$$EG_{10} = a + b(PR).$$

Table 2. Payout Ratios and Subsequent 10-Year Earnings Growth: Quartile Comparisons, 1946–1991

Starting Payout Quartile	Average	Worst	Best
1 (low)	–0.4%	–3.4%	+3.2%
2	+1.3	–2.4	+5.7
3	+2.7	–1.1	+6.6
4 (high)	+4.2	+0.6	+11.0

real earnings growth over the next decade; growth has actually fallen 0.4 percent a year on average—ranging from a worst case of truly terrible –3.4 percent compounded annual real earnings for the next 10 years to a best case of only 3.2 percent real growth a year over the next decade. From a starting point of very high payout ratios, the opposite has occurred: strong average real growth (4.2 percent), a worst case of positive 0.6 percent, and a maximum that is a spectacular 11.0 percent real growth a year for 10 years. Indeed, the very early evidence from the last few quarters (late 2001) would suggest that the recent record low payout ratio and earnings growth are falling into the classic pattern. Contrary to the arguments of the "new paradigm" advocates, earnings have been tumbling, not soaring, since earnings retention reached record levels. Of course, the most recent 10-year observations from these payout-ratio lows remain to be seen.

Potential Explanations

Many hypotheses might explain the (perhaps surprising) positive relationship between current payout ratio and future real earnings growth. The following list, although clearly incomplete, represents a beginning effort to explain this phenomenon:

- Corporate managers are loath to cut dividends (Lintner 1956). Perhaps a high payout ratio indicates managerial confidence in the stability and growth of future earnings and a low payout ratio suggests the opposite. This confidence (or lack of it) might be based on public information but also private information (see, for example, Miller and Rock 1985).
- Another hypothesis consistent with the relationship we empirically observed is that companies sometimes retain too much of their earnings as a result of the managers' desires to build empires (Jensen 1986).[11] There need not be anything nefarious in this behavior: An otherwise benign coincidental policy of earnings retention may end up encouraging empire building by creating an irresistible cash hoard burning a hole in the corporate pocket. Conversely, financing through share issuance and paying substantial dividends, although perhaps less tax efficient, may subject management to more scrutiny, reduce conflicts of interest, and thus curtail empire building. (The assumption is, of course, that inefficient empire building lays the foundation for poor earnings growth in the future whereas discipline and a minimization of conflicts has the opposite, salutary effect.)
- Perhaps the positive relationship is driven by sticky dividends (see Lintner) combined with mean reversion in more volatile earnings. Temporary peaks and troughs in earnings, subsequently reversed, could cause the payout ratio to be positively correlated with future earnings growth (i.e., temporarily low earnings today cause a high payout ratio, thus forecasting the earnings snapback tomorrow). The testable difference between this hypothesis and the first two is that dividend policy has no special standing, so any reasonable measure of mean reversion in earnings should work to forecast future earnings growth.
- Perhaps our data or experimental design are in error. For instance, perhaps our results are time-period specific (either as to the years covered by our study or the length of our forecasting period). Or maybe our results merely proxy for other, more fundamental variables that forecast economic activity. Or perhaps our results are just random noise.

Clearly, distinguishing the first two hypotheses from each other, or confirming or rejecting either, is beyond the scope of this article.[12] We simply note that each of these stories fits the data. Next, we carry out some very preliminary investigations but leave more precise tests, or the introduction of new explanations, to future work.

Robustness Tests

Readers might and should be skeptical of a relationship that consists of forecasting overlapping 10-year earnings growth over a 55-year span when strongly serially correlated payout ratios are used. Arguably, we have only slightly more than five truly independent observations. Although statistical tools can adjust regression *t*-statistics for this phenomenon and R^2 measures remain legitimate, relationships of this type may seem statistically significant even when they are not. A diligent mining of the available data without economic intuition or finding results that spuriously proxy for some other more basic relationship could deliver our findings without the causality that we infer. Because this possibility can never be completely dismissed and because we know our results are the opposite of what so many would intuitively expect, we carried out extensive robustness checks. The checks included methodologically motivated tests (e.g., tests in out-of-sample periods, tests for small specification changes that might change results, etc.) and economically motivated tests (tests of whether the power of the payout ratio is coming from the reasons we hypothesized or from other sources).

Methodological Tests. The simplest robustness check is an out-of-sample test. We favored the post-WWII period in the discussion so far because of our confidence in the data quality and its relevance to today's world, but we do have data back to 1871. Accordingly, Table 1 shows in the last row the same regression for the prior, entirely separate, 1871–1945 period. The coefficients and the R^2 value are smaller, which might make sense in light of the more volatile earnings and noisier data before 1946. But the *t*-statistics are still quite strong, and the relationship still explains 19.5 percent of the variance of earnings. Most importantly, the coefficient has the same counterintuitive positive sign.

Also, as is evident in the scatterplot of Figure 2, eliminating the most extreme (highest and lowest 10 percent) of payout ratios from the 1946–2001 data (i.e., dropping those observations) would have little effect on the regressions.

Sensitivity to 10-Year Forecasting Horizon. We focused on 10-year periods because we were ultimately interested in the impact of real growth on fair valuation. Transient short-term peak-and-trough earnings should have little impact on the proper price to pay for stocks; only long-term earnings prospects should matter. We arbitrarily chose 10-year spans to balance two conflicting goals—a span long enough to be of economic significance (the long term) but short enough to have a reasonable number of independent periods and to have some relevance to an investor's career horizon.

For a robustness check, we repeated our tests on 5-year real earnings growth. In so doing, we probably sacrificed some economic relevance; strong statements about 10-year earnings growth are more important to fair value than statements about 5-year growth. But we doubled the number of nonoverlapping periods. The first two rows of **Table 3**, which contain results for 1946–2001 and 1871–2001, demonstrate that the link we identified holds up nicely for shorter earnings-growth periods.

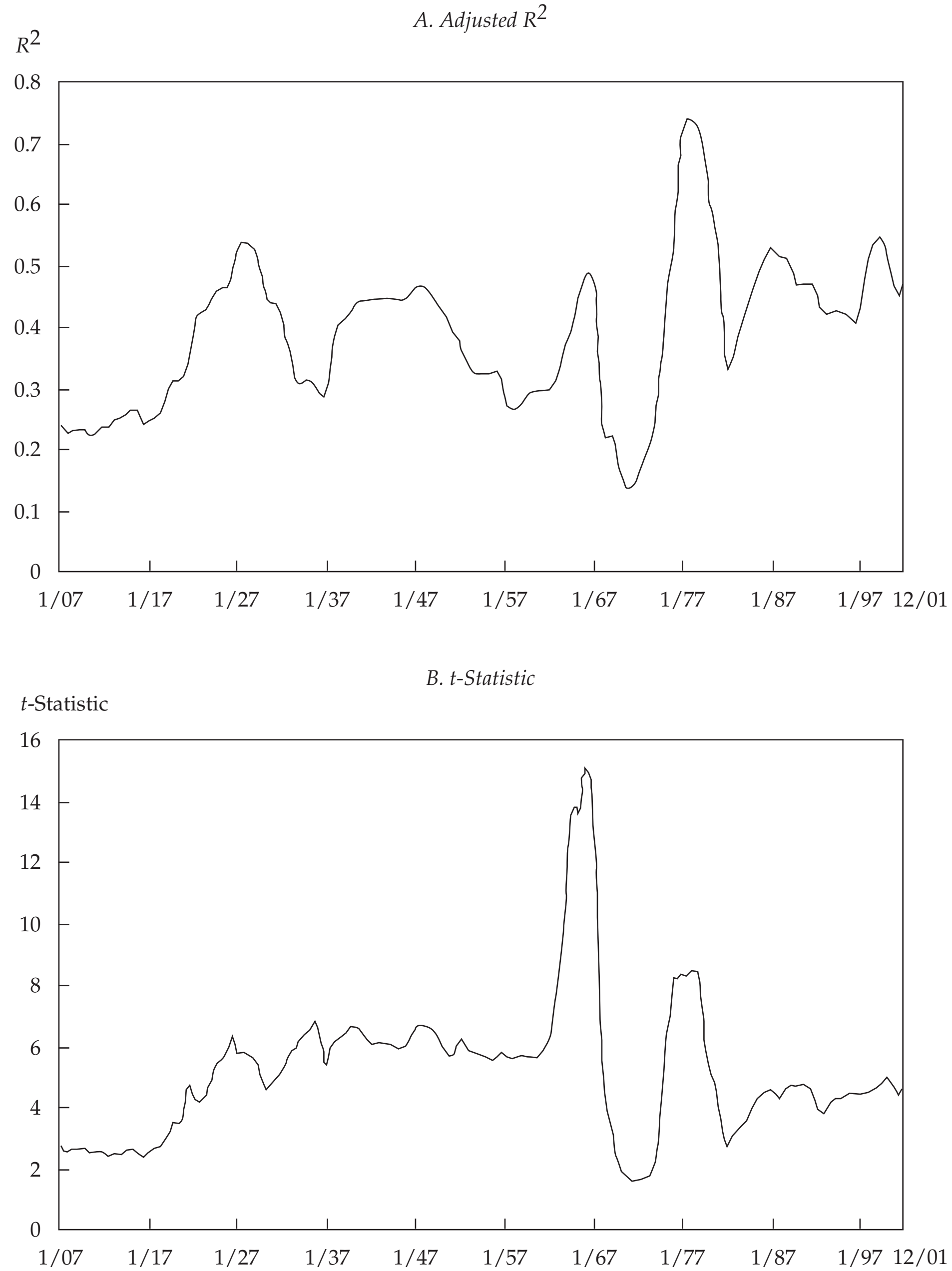
Table 3. Five-Year Earnings Growth as a Function of Payout Ratios: Regression Coefficients
(*t*-statistics in parentheses)

Regression Span	*a*	*b*	Adjusted R^2
1946–2001	–21.3%	0.44*PR*	53.8%
	(–6.0)	(7.3)	
1871–2001	–11.3	0.19*PR*	24.0
	(–5.2)	(6.7)	
1871–1945	–18.0	0.26*PR*	34.1
	(–4.7)	(5.8)	
1946–1979	–22.2	0.45*PR*	61.1
	(–5.6)	(6.8)	
1871–1979	–12.9	0.21*PR*	26.8
	(–5.1)	(6.6)	
1980–2001	–21.1	0.46*PR*	49.6
	(–3.5)	(4.4)	

Note: Regression equation is $EG_5 = a + b(PR)$.

Predictive Consistency. For testing the consistency of our R^2 and *t*-statistic results, we again used five-year results so that we could consider more independent data points. We performed the monthly regression of five-year real S&P 500 earnings growth on the starting payout ratio on a rolling 30-year basis for every 30-year span from 1871 through 2001.[13] Panel A of **Figure 3** traces the R^2 and Panel B traces the *t*-statistics on the coefficient for the payout ratio from each of these rolling regressions. Results indicate substantial variation over time, as one would expect: The statistical noise in the relationship should cause such variability, and the fundamental relationship may strengthen or weaken with changes in the economic, tax, or

Figure 3. Consistency of 30-Year Regressions: $EG_5 = a + b(PR)$, 1871–2001



political environment. Nevertheless, the basic message exhibits considerable stability: When payout ratios are low, future earnings growth tends to be slow, and high payout ratios go hand in hand with rapid subsequent earnings growth. The lowest *t*-statistic is still a respectable (certainly for an order statistic) 1.6; similarly, the R^2, although variable, is always economically meaningful. The lowest R^2 and highest R^2 are, respectively, 13 percent and 74 percent. Most importantly, the sign never changes.

Proxy for Mean Reversion? Mean reversion in earnings might be caused by true mean reversion or by transient errors in reported earnings that would induce apparent mean reversion in the contiguously measured changes. A temporary drop in earnings could raise expected future compound earnings growth from this lower base. The temporary earnings drop would simultaneously raise the current payout ratio, *D/E*, because sticky dividends do not fall as much as earnings. Finding this kind of mean reversion might still be interesting, but dividend policy would have no special standing as a predictor. We tested for this case by adding direct measures of mean reversion in earnings to our regressions and comparing their significance with the remaining significance of the payout ratio.

First, we added prior-10-year real earnings growth to the regression as lagged earnings growth (LEG_{10}). If the mean-reversion hypothesis is true, then adding prior earnings growth as an additional right-hand-side variable could explicitly show the mean reversion we are looking for (through a negative coefficient as poor prior 10-year real growth forecasts superior subsequent growth and vice versa) and might cause the payout ratio to lose much of its importance in bivariate tests. Panel A of **Table 4** shows that simple mean reversion in 10-year earnings growth has the expected negative sign but is a weak predictive variable. Specifically, this measure neither approaches the efficacy of the payout ratio over any time period nor materially crowds out the efficacy of the payout ratio, particularly for the 1946–2001 period.

We constructed a second proxy for mean reversion in earnings by dividing the prior-1-year real earnings (also used to construct our payout-ratio variable) by the average of real earnings over the past 20 years (MA_{20}).[14] We hypothesized that when this variable is high, the temporary component of earnings will be high, and we expected this variable to forecast lower subsequent real earnings growth.[15] Panel B of Table 4 shows the results: For the most recent and most relevant period, 1946–2001, the payout ratio is the clear victor. The ratio MA_{20} has the expected negative sign (meaning that when earnings are below their long-term average, better growth over the next 10 years is forecasted), but the relationship is weak and does not at all ameliorate the power of the payout ratio. Including periods prior to 1946 produces more-competitive results; the two variables enter with similar power and the "right" signs (positive for payout, negative for MA_{20}), although the payout ratio is still the clear victor. Multicolinearity makes the t-statistics and the relative contribution of each variable difficult to determine, particularly for the earlier period (the correlations between payout and MA_{20} are –0.44 for 1946–2001, –0.63 for 1871–2001, and –0.69 for 1871–1945).

The payout ratio's predictive power admirably survives head-to-head competition against two reasonable proxies for simple mean reversion in earnings (although MA_{20}, in particular, shows some competitive forecasting power when a very old sample period is included). Although the payout ratio is (and, intuitively, should be) highly correlated with measures of simple mean reversion in real earnings, the data show important marginal information contained in dividend policy, indeed more information (and much more in the modern time period) than provided by other measures of mean reversion.[16]

Note that, in some sense, these tests should not be viewed as "payout ratio versus mean reversion." Clearly, the payout ratio can be interpreted as one measure of how depressed or how strong earnings are (in this case, dividends are used as a yardstick) and thus how much we might expect them to revert to the mean. In other words, rather than view these

Table 4. Ten-Year Earnings Growth as a Function of Payout Ratios and Direct Measure of Mean Reversion: Regression Coefficients
(t-statistics in parentheses)

Regression Span	a	b_1	b_2	Adjusted R^2
A. Reversion as prior-10-year earnings growth: $EG_{10} = a + b_1(PR) + b_2(LEG_{10})$				
1946–2001	–11.0%	0.25PR	–0.09LEG_{10}	55.3%
	(–5.7)	(7.9)	(–0.6)	
1871–2001	–2.0	0.06PR	–0.09LEG_{10}	15.3
	(–1.9)	(3.9)	(–0.9)	
1871–1945	–4.5	0.08PR	–0.06LEG_{10}	19.4
	(–2.6)	(6.1)	(–0.4)	
B. Reversion as current earnings/20-year average: $EG_{10} = a + b_1(PR) + b_2(MA_{20})$				
1946–2001	–9.0%	0.24PR	–0.02MA_{20}	56.6%
	(–2.8)	(7.0)	(–1.3)	
1871–2001	2.3	0.05PR	–0.03MA_{20}	22.8
	(0.7)	(2.6)	(–1.7)	
1871–1945	2.0	0.05PR	–0.04MA_{20}	26.2
	(0.4)	(2.1)	(–1.4)	

results as a refutation of mean reversion and an affirmation of the payout ratio as a predictor, the finding can be viewed as the discovery that scaling earnings by dividends (the payout ratio) produces an effective and consistent measure of mean reversion in earnings—more effective and consistent than several other reasonable candidates, particularly in the modern era. Earnings do indeed seem to revert to the mean but may revert most strongly in terms of their ratio to dividends.

Stock Repurchases. Share buybacks were a far smaller part of the market prior to 1980 (see, for instance, Bagwell and Shoven 1989 and Fama and French 2002). The increase in share buybacks in recent years is one potential pitfall for our study. If buybacks substitute for regular dividends, then our measure of the payout ratio may be effectively understated when buyback activity is high. Buybacks can also raise EPS growth. If stock buybacks are substituting for dividends, then changes in buyback activity should weaken our results: Falling payout ratios in the 1980–2001 span, if attributable to share buybacks, could correspond to increases in subsequent earnings growth.

We were able to test for the influence of a changing buyback atmosphere only indirectly. If the relationship between payout ratio and future earnings growth is similar in the pre- and post-1980 periods, we could feel comfortable that the relatively new phenomenon of large-scale share buybacks was not unduly influencing our results (in either direction). Therefore, we recomputed the results for the regression of five-year earnings growth as a function of the payout ratio for only the 1946–1979 period and 1871–1979 (we used five-year data because we had even fewer data for this test). The results are shown in the fourth and fifth rows of Table 3. In these earlier periods, which experienced far fewer share buybacks than the 1980–2001 period, the link between payout ratios and real earnings growth worked almost exactly as well as over the longer span.[17] Table 3 also presents, in the last row, evidence for the relatively short period associated with a large amount of buybacks, 1980–2001. Here again, despite the paucity of data, we found strong results of a link.

To be fair, one cannot know the impact of the increase in buybacks, assuming the increase is permanent, until far more data are available than this brief 20-year history. From the initial evidence, however, stock buybacks have apparently not made the importance of the dividend payout ratio "different this time."

The Payout Ratio against the Yield-Curve Slope. Other research (e.g., Harvey 1991) has shown that the slope of the U.S. Treasury yield curve is a strong positive forecaster of economic growth.[18] This finding invites two questions relating to our research. If the yield-curve slope forecasts economic growth, does it also forecast earnings growth? If so, does the yield-curve slope augment or subsume the power of payout ratios for forecasting earnings growth? Either could happen if, for example, the curve is very steep during recessions, precisely when the payout ratio is larger than average (because of depressed earnings and sticky dividends).

To answer these two questions, we began by defining the yield-curve slope as the difference between the 10-year T-bond yield and the 3-month T-bill yield at the start of any period. We tested the forecasting power of the yield-curve slope (*YCS*) for both 10-year and 5-year real earnings growth. **Table 5** presents the results.

This discussion will focus on the 1946–2001 period because interest rates were not always freely floating before this period, but Table 5 also presents results for the earlier 1871–1945 period and the full 1871–2001 period. Panel A shows that the yield-curve slope, when used alone to forecast earnings growth, generally has the anticipated sign. Not only does a steeper yield curve suggest a stronger future economy, as found by other authors, but it also suggests faster real earnings growth, although the yield curve has much more power for forecasting 5-year growth than 10-year growth. This finding conforms with the work of Fama and French (1989), who noted that the yield-curve slope seems to be correlated with relatively high-frequency elements of the business cycle. As Panel B of Table 5 makes clear, however, the yield curve's power does not come close to driving out the much stronger power present in the payout ratio.

The bottom line is that yield-curve slope has the right sign from 1946–2001 (and most other periods) but is a relatively weak predictor of earnings growth. The yield-curve slope does not approach the univariate forecasting power of the payout ratio, nor does it erode the efficacy of the payout ratio when included in bivariate forecasting regressions.

The Payout Ratio against Stock Market Valuation Levels. Should the market's earnings yield, instead of the payout ratio, predict earnings growth? If future real earnings growth is going to be faster than normal, investors should perhaps pay a higher P/E multiple than normal and, hence, accept a lower earnings yield on their investments.[19] Thus,

Table 5. Earnings Growth as a Function of the Yield-Curve Slope and Payout Ratio: Regression Coefficients
(t-statistics in parentheses)

Time Span	a	b_1	b_2	Adjusted R^2
A. Earnings growth as a function of yield-curve slope				
Ten-year earnings growth: $EG_{10} = a + b_1(YCS)$				
1946–2001	1.56%	0.38YCS		2.0%
	(2.8)	(1.2)		
1871–2001	1.3	0.44YCS		2.2
	(2.0)	(1.4)		
1871–1945	1.2	0.43YCS		1.8
	(1.3)	(1.0)		
Five-year earnings growth: $EG_5 = a + b_1(YCS)$				
1946–2001	0.6%	1.70YCS		14.0%
	(0.7)	(2.5)		
1871–2001	0.3	2.09YCS		11.3
	(0.3)	(3.6)		
1871–1945	0.3	2.20YCS		10.5
	(0.2)	(2.9)		
B. Earnings growth as a function of yield-curve slope and payout ratio				
Ten-year earnings growth: $EG_{10} = a + b_1(YCS) + b_2(PR)$				
1946–2001	–11.6%	0.14YCS	0.25PR	54.8%
	(–7.0)	(0.5)	(7.8)	
1871–2001	–3.0	0.17YCS	0.07PR	14.5
	(–3.0)	(0.7)	(4.1)	
1871–1945	–5.5	–0.24YCS	0.09PR	19.9
	(–3.8)	(–0.7)	(6.9)	
Five-year earnings growth: $EG_5 = a + b_1(YCS) + b_2(PR)$				
1946–2001	–20.8%	0.99YCS	0.41PR	58.2%
	(–6.3)	(2.2)	(6.9)	
1871–2001	–10.8	1.46YCS	0.17PR	29.2
	(–5.1)	(2.8)	(5.2)	
1871–1945	–17.0	0.53YCS	0.24PR	34.5
	(–3.9)	(0.7)	(4.4)	

in an efficient market with constant expected equity returns, a low earnings yield may be a good predictor of higher future real earnings growth. **Table 6** shows the results from a regression of 10-year earnings growth on the payout ratio and the earnings yield, *E/P*, for various periods. The relationship is as expected: For the modern period, a low earnings yield (high P/E) signals high future 10-year real earnings growth, with a t-statistic of –2.5. This finding supports the view that the market correctly anticipates faster future earnings growth and pays up for it. Results for the other time periods offer additional support for this finding.

This relationship is far weaker, however, than the link we found between the starting payout ratio and future earnings growth, and the relationship suffers greatly in multiple regression tests, as Panel B shows. In the tests for forecasting 10-year earnings growth using both the starting payout ratio and the earnings yield, the payout ratio completely drives out the earnings yield for the 1946–2001 period. The sign for E/P actually reverses, so conditional on payout ratio, a lower E/P (higher P/E) presages slightly lower earnings growth. The success of E/P is greater when older data are included, as shown especially for the full period. On balance, however, the verdict is clear: The power of market valuation levels to forecast future returns is weaker than the power of the payout ratio—particularly in the modern period. For the post-WWII period, the difference is startling.[20]

We found this result extremely interesting. Suppose real earnings growth is strong and the market expects this trait to continue. Investors might then be willing to pay a premium multiple of these strong earnings, which would result in a

Table 6. Ten-Year Earnings Growth as a Function of Earnings Yield and Payout Ratio, Regression Coefficients
(*t*-statistics in parentheses)

Regression Span	a	b_1	b_2	Adjusted R^2
A. Ten-year earnings growth as a function of earnings yield: $EG_{10} = a + b_1(E/P)$				
1946–2001	5.1%	–0.38(E/P)		17.5%
	(3.2)	(–2.5)		
1871–2001	5.5	–0.50(E/P)		10.2
	(3.3)	(–3.0)		
1871–1945	6.3	–0.65(E/P)		10.5
	(2.3)	(–2.2)		
B. Ten-year earnings growth as a function of earnings yield and payout ratio: $EG_{10} = a + b_1(E/P) + b_2(PR)$				
1946–2001	–11.8%	0.01(E/P)	0.25PR	54.5%
	(–2.9)	(0.1)	(5.2)	
1871–2001	0.2	–0.28(E/P)	0.05PR	16.6
	(0.1)	(–1.9)	(3.1)	
1871–1945	–2.5	–0.22(E/P)	0.07PR	20.2
	(–0.6)	(–0.7)	(4.5)	

lower-than-normal earnings yield (high P/E). Now suppose that, at this same time, many companies are unwilling to pay out high dividends—possibly in an effort to optimize the tax treatment of their shareholders but perhaps because the managers know the good times will not last or are, conversely, caught up in the "irrational exuberance" of the good times and are spending those retained earnings on inefficient empire building. In this case, the P/E is optimistic about the future but the payout ratio is not. Which should one believe?

The regression results in Table 6 suggest that for forecasting future real earnings growth, look at managers' dividend policies rather than what the market will pay for each dollar of earnings. More often than not, it is the payout ratio, not the valuation level, that gets it right.

Link to the Macro Economy. Recall that the empire-building hypothesis says that when payout ratios are low, the reason may be that companies are retaining cash to invest in unwise, low-return projects, perhaps building up a large organization to benefit the managers rather than shareholders. In addition, perhaps building an empire with retained cash is easier than paying dividends and issuing stock to finance expansion (which would subject the managers to the added scrutiny of the capital markets).

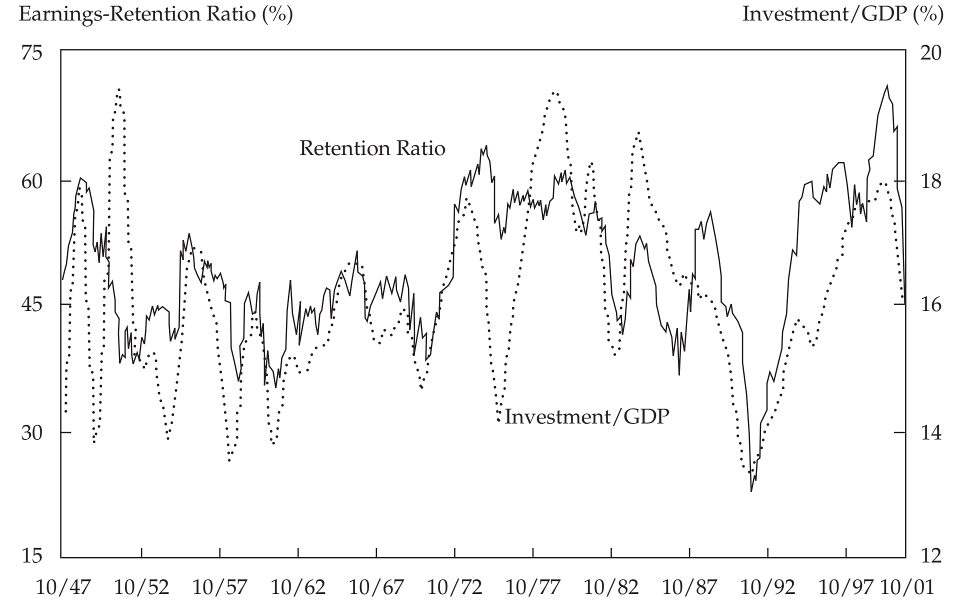
In what must be viewed as preliminary tests of this conjecture, we examined whether the payout ratio is correlated through time with a measure of economy-wide investment. For each quarter since 1947 (when our data source begins), using the St. Louis Federal Reserve Bank's FRED database, we formed the ratio of gross private domestic investment (GPDI) to GDP. We summed the last four quarterly observations to form annual investment and GDP figures, and we now focus on this ratio:

$$\frac{\text{Investment}}{\text{GDP}} = \frac{\text{Last four quarters of GPDI}}{\text{Last four quarters of GDP}}.$$

The idea was to form a simple measure of whether current investment is running high or low. If the empire-building hypothesis is true, we should see a positive correlation between investment/GDP and the retention ratio (1.0 minus the payout ratio). In other words, the more earnings companies are retaining, the more investment we should see. But this is not necessarily true. For instance, if tax optimization is driving recent low payouts, not the desire to invest more than usual, low payouts could simply be being offset by other forms of distribution (e.g., buybacks, less issuance of new shares, etc.).

Figure 4, which is a plot of aggregate investment to GDP and the retention ratio on separate axes, indicates that the correlation between these two variables, at +0.66, is strong. Interestingly, such a correlation with payout largely vanished when we compared investment/GDP with our proxies for mean reversion in S&P 500 earnings. The correlation of investment/GDP with lagged 10-year earnings growth, current earnings divided by their long-term moving average, and current earnings divided by current GDP were all found to be less than half the 0.66 correlation of investment/GDP with the payout ratio. Clearly, times of high cash retention (low dividends) are also times of high investment for the economy at large, but times of

Figure 4. S&P 500 Earnings-Retention Ratio and Aggregate Investment/GDP, 1947–2001



high investment are not necessarily times of depressed earnings. Note, in particular, that in late 1999 and early 2000 (prior to the technology bubble bursting), both series were very high, indicating that the high retention rates at corporations were not simply the result of tax optimization (i.e., substituting capital gains for dividend income) but did, in fact, coincide with higher-than-normal investment. On this measure, dividend policy and investment policy (at least at the macroeconomic level) are not even close to independent.

An interesting aspect is that, as **Table 7** and **Table 8** show, the payout ratio and investment/GDP (*INVEST/GDP*) both forecast 10-year real earnings growth *and* 10-year real GDP growth with signs consistent with our story (that is, more retention is a forecast of lower earnings and more investment is a forecast of lower GDP growth).[21] And, as for the payout ratio, the sign for *INVEST/GDP* is again "wrong"!

As with earnings growth, our findings for GDP are not being driven by simple mean reversion. Forecasts of the next 10 years' real GDP growth based on the previous 10 years' growth shows a modest continuation effect rather than mean reversion; also, errors in GDP that were later reversed would lead to a high *INVEST/GDP*, forecasting positive, not negative, future growth. Instead, as with earnings and dividends, we found the counterintuitive result that when investment is high as a percentage of GDP, future GDP growth is low. Although we are reporting only an initial investigation, we consider it interesting corroborating evidence for the empire-building explanation of the payout ratio's power.

Table 7. Ten-Year Earnings Growth as a Function of Investment/GDP and Payout Ratio: Regression Coefficients, 1947–2001 Data
(t-statistics in parentheses)

Earnings Growth	a	b_1	b_2	Adjusted R^2
A. $EG_{10} = a + b_1(INVEST/GDP)$				
EG_{10}	12.9%	–0.70(*INVEST/GDP*)		18.3%
	(6.4)	(–5.3)		
B. $EG_{10} = a + b_1(PR) + b_2(INVEST/GDP)$				
EG_{10}	–9.8%	0.22*PR*	–0.02(*INVEST/GDP*)	41.5%
	(–1.0)	(2.9)	(–0.1)	

Table 8. Ten-Year GDP Growth as a Function of Investment/GDP and Payout Ratio: Regression Coefficients, 1947–2001 Data
(t-statistics in parentheses)

Earnings Growth	a	b_1	b_2	Adjusted R^2
A. $GDP_{10} = a + b_1(INVEST/GDP)$				
GDP_{10}	8.9%	–0.36($INVEST/GDP$)		22.0%
	(5.3)	(–3.9)		
B. $GDP_{10} = a + b_1(PR)$				
GDP_{10}	–0.1% +	0.08PR		22.0%
	(–1.2)	(4.3)		
C. $GDP_{10} = a + b_1(PR) + b_2(INVEST/GDP)$				
GDP_{10}	4.4%	0.05PR	–0.22($INVEST/GDP$)	26.2%
	(1.5)	(1.8)	(–2.0)	

This investment/GDP result is also a significant robustness check on our earlier work. Our main results are for forecasting a version of index fund EPS. Regardless of our other robustness checks, EPS changes still could, because of index changes or corporate actions, be contaminating our data. Similarly, although the results are seemingly robust through time, the possibility that tax changes or changing sensitivity to, or awareness of, tax optimization could skew the decision to retain versus pay out earnings. Importantly, although perhaps bringing its own baggage, the ratio of investment to starting GDP as a forecast of real GDP growth suffers from none of these potential problems. The fact that the results indicate a phenomenon occurring that is very similar to the payout-ratio forecasting earnings growth is quite reassuring for fans of the empire-building story. Similarly, the fact that investment/GDP is highly correlated with the payout ratio but not with other measures, such as lagged earnings growth or current earnings versus a moving average, is a blow to those who might otherwise believe that our results for the payout ratio are driven by simple mean reversion in earnings.

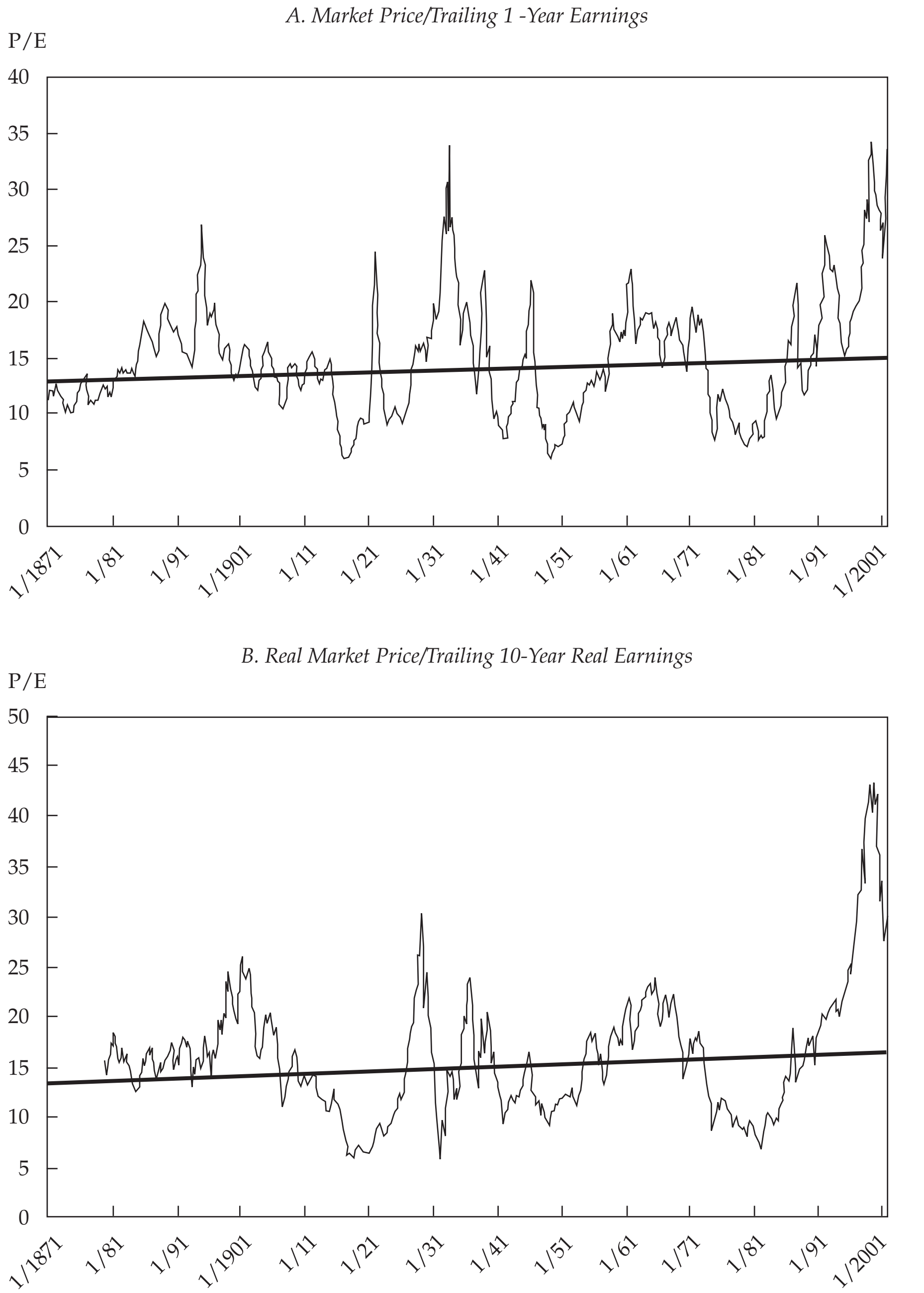
Implications

What are the implications of our findings for investors and for the equity markets? After a painful two-year bear market dating from March 2000, some might now, as of the writing of this article in early 2002, judge equities to be cheap by comparing today's prices with the unprecedented levels of late 1999 and early 2000. Noting the dramatic fall, one might now favor the purchase of equities as a "contrarian" recommendation. Compared with history, however, stocks are anything but cheap, as is evident by the history of P/Es in Panel A of **Figure 5**.

Panel A shows that P/Es based on one-year trailing earnings are at their highest level ever; despite falling prices, the plunge in recent earnings has driven the S&P 500's P/E to an extreme. Some might argue that this picture overstates the case, because recent earnings are perhaps abnormally low (or, if we may be provocative, the 1999/2000 earnings were abnormally high). The P/E based on 10 years of trailing real earnings shown in Panel B, however, shows valuations comparable to right before the crash of 1929 and higher than at all times in history except during the bubble preceding 1929—or the bubble of 1999–2000. Arguing that today's 10-year P/E value is overstated would be hard. Other metrics are similar. Basically, compared with history, stocks remain expensive.[22]

Will the premium price be rewarded? Many authors and observers (e.g., Shiller 2000; Arnott and Ryan 2001; Arnott and Bernstein 2002; Asness 2000a) have noted that the high prices of equities today, coupled with a historically reasonable estimate of future earnings growth, have led to low estimates of future real returns and of the future equity risk premium. Some, taking a stance based on efficient markets (notably, Ibbotson and Chen 2003), disagree. In effect, they combine (1) the assumption of market efficiency, (2) the assumption that the Miller and Modigliani propositions hold intertemporally (that is, that high retention rates imply high future growth rates), and (3) the assumption that expected market returns do not vary through time. Based on these three assumptions, they contend that recent high P/Es do not alter the likely future rates of return. Low payout ratios will lead to faster earnings growth and recent high P/Es also mean that future earnings growth will make up for the low earnings yield. In other words, the omniscient invisible hand of an efficient market will adjust growth to compensate for any

Figure 5. Price to Earnings, 1871–2001



valuation level or payout, thereby providing a constant expected return!

This reasoning, this set of assumptions, and this forecast for high growth, which are sound in theory, are clearly rejected by our empirical work. We find no historical empirical support for the rationale. Ibbotson and Chen, via their intertemporal interpretation of Miller and Modigliani, would forecast higher-than-normal real earnings growth as a direct result of lower-than-normal dividend payouts. Our empirical results show the opposite. Similarly, a high P/E, contrary to the assumptions of Ibbotson and Chen, has almost no power to forecast future earnings growth in the presence of the payout ratio.

Essentially, prior to the plunge in earnings in late 2001, investors faced a situation of very high P/Es and very low payout ratios. History says such a period is a time of poor expected long-term future earnings growth. By the very end of 2001, the situation had changed; one-year earnings had plunged, sending payout ratios somewhat upward but sending P/Es into the stratosphere. In either situation, our results imply that forward-looking forecasts of the equity premium are very low compared with history.

The recent condition of very high P/Es and very low payout ratios combines expensive valuation and a low forecast of earnings growth. History suggests that this combination is clearly a recipe for low expected returns. The current condition, now that earnings have tumbled and payout ratios have returned closer to "normal," suggests more reasonable forecasts of earnings growth but from a now-reduced earnings base. With a historically off-the-charts P/E, this change provides little solace.

Finally, what do our findings mean for the ongoing controversy over executive stock options?[23] One nuance of the issuance of executive stock options is that they may provide an incentive to managers not to pay dividends, because dividends reduce the stock price on which their options are valued. Recall that one leading explanation for the perverse predictive power we found for the payout ratio is that some executives probably engage in unproductive empire building when they do not pay out sufficient dividends. The potential danger of such behavior when combined with the disincentive to pay dividends that might accompany executive stock options is as obvious as it is worrisome.

Conclusion

We did not start out trying to forecast gloom and doom. We started out by looking at the optimists' assertion that today's low payout ratios are a strong positive signal for future growth. Unfortunately, this view is emphatically inconsistent with the historical evidence.

Unlike optimistic new-paradigm advocates, we found that low payout ratios (high retention rates) historically precede low earnings growth. This relationship is statistically strong and robust. We found that the empirical facts conform to a world in which managers possess private information that causes them to pay out a large share of earnings when they are optimistic that dividend cuts will not be necessary and to pay out a small share when they are pessimistic, perhaps so that they can be confident of maintaining the dividend payouts. Alternatively, the facts also fit a world in which low payout ratios lead to, or come with, inefficient empire building and the funding of less-than-ideal projects and investments, leading to poor subsequent growth, whereas high payout ratios lead to more carefully chosen projects. The empire-building story also fits the initial macroeconomic evidence quite well. At this point, these explanations are conjectures; more work on discriminating among competing stories is appropriate.

Sometimes the world really does change. For instance, the recent low market payout ratios may indeed be the result of a new sensitivity to shareholder tax optimization, not a result of more negative forces (e.g., empire building, manager pessimism). In such a case, expected growth from recent low payout ratios might be much better than history would suggest, perhaps even strong enough to offset high prices and/or low payouts and deliver historically normal returns. But those forecasting this optimistic result are running into a headwind of 130 years of history; thus, the burden of proof should fall on them. They must show why high cash retention is no longer a negative for future growth (or even a neutral event for future growth) but is now, rather, a significant positive omen. In effect, they must show that change has created a truly new paradigm. With P/Es still extraordinarily high by any measure, this burden is not a light one.

We would like to thank Peter Bernstein, John Bogle, Sr., Michael Brennan, Christopher Brightman, Edward Chancellor, Peng Chen, Roger Clarke, Brad Cornell, Max Darnell, Russell Fogler, Kenneth French, Roger Ibbotson, Wayne Kozun, Robert Krail, Owen Lamont, John Liew, Tom Philips, Bill Reichenstein, and Rex Sinquefield for very helpful comments and suggestions.

Notes

1. Miller and Modigliani posited and proved that in an ideal world, and in the absence of tax arbitrage considerations, dividend policy should not matter. Why? Because capital is fungible: A company has no reason to care whether it garners capital for projects from bond issuance, from stock issuance, or from retained earnings; therefore, the company should go wherever the risk-adjusted cost of capital is lowest. Reciprocally, an investor has no reason to care whether an investment pays a dividend that the investor can reinvest or whether the company reinvests earnings itself to fuel earnings growth equivalent to the forgone dividend yield. Thus, changes in dividend policy should not affect firm value. Similarly, investment policy and dividend policy should be independent.
2. Miller and Modigliani focused neither on intertemporal comparisons nor on dividend policy at an aggregate market level. The oft-cited intertemporal argument we examine is an extrapolation of Miller and Modigliani theory suggested by many analysts and strategists to justify rapid future earnings growth for the broad stock market. Ibbotson and Chen (2003) sum up this viewpoint well when they state that for the market as a whole, "Furthermore, our forecasts

are consistent with Miller and Modigliani (1961) theory, in that dividend-payout ratios do not affect P/Es and high earnings-retention rates (usually associated with low yields) imply higher per share future growth." (p. 00)

3. For more discussion of current approaches to estimating future returns, see the presentations and discussions at www.aimrpubs.org/ap/home.html from AIMR's *Equity Risk Premium Forum*.
4. The Schwert data are for January 1802 through December 1925; the Shiller data are for February 1871 through March 2001; and the Ibbotson data are for January 1926 through December 2000. Each source provides broad capitalization-weighted stock market yields and total returns; Shiller's data also include earnings. With regard to Shiller's data, monthly dividend and earnings data were computed from the S&P 500 Index four-quarter totals for the quarters since 1926, with linear interpolation to monthly figures. Dividend and earnings data before 1926 are from Cowles (1939) and interpolated from annual data.
5. These data came from Standard and Poor's for 1926 to date and from Cowles for periods before 1926.
6. Yields on 10-year government bonds came from the NBER for January 1800 through May 2001. Note: data were annual until 1843; we interpolated the data for monthly estimates. Long-term government bond yields and returns for January 1926 through December 2000 came from Ibbotson Associates.
7. NBER data spanned January 1801 through May 2001. Note: data were annual until 1950; we interpolated the data for monthly estimates. Ibbotson Associates data spanned 1926 through December 2000. We gave Ibbotson data primary (two-thirds) weighting for 1926–1950 because the NBER data are annual through 1950.
8. We used NBER data for January 1800 through March 2001. The NBER data are annual GNP figures through 1920 (which we interpolated July to July for our monthly data) and quarterly GDP figures for 1921–2001.
9. All *t*-statistics in this article have been adjusted for overlapping observations (the Newey–West 1987 correction).
10. Benartzi, Michaely, and Thaler (1997) found a different but related result for the cross-section of companies, namely, that dividend changes across stocks are not strong forecasters of cross-sectional differences in future earnings growth. In contrast and with results more similar to our findings, Nissim and Ziv (2001) found that dividend changes do contain information about future profitability. Although similar in spirit to our approach, these papers differ in two important ways from our tests. First, our tests are on the level of payout ratio policy, not dividend changes. Second, our results are for the aggregate market, not the cross-section of differential company growth.
11. Brealey and Myers (2000) described empire building as follows: "Other things equal, managers prefer to run large businesses rather than small ones. Getting from small to large may not be a positive-NPV undertaking" (p. 321). They went on to quote Jensen with, "The problem is how to motivate managers to disgorge the cash rather than investing it below the cost of capital or wasting it in organizational inefficiencies" (p. 323). In addition to the 1986 Jensen paper, see also Jensen and Meckling (1976).
12. Note, however, that the third and fourth explanations can be tested.
13. The start was 1901 because the 30-year window goes back to our data beginning in 1871. The first sample period is 1871–1901, and the most recent is 1971–2001. Thus, we had 100 years of rolling 30-year spans and at least four completely nonoverlapping periods.
14. Dividing by 10 years of real earnings led to similar inferences.
15. Both the payout ratio and MA_{20} are scaled versions of current earnings. One scales on dividends, and the other scales on past average real earnings. So, our test was whether scaling by average historical earnings or scaling by dividends is the more effective forecaster.
16. We ran three more tests of whether simple mean reversion (unrelated to dividends) is driving the strong 1946–2001 results. First, instead of using last year's earnings as the E to calculate the payout ratio, we used a three-year average of real earnings. If transitory components of E are driving the payout ratio's predictive power, then using a longer, more stable version of E might drive out this power. Second, in a draconian test, we simply lagged the payout ratio by one full year, greatly reducing the chance of highly transitory components of E driving our results. Third, we tried real earnings divided by real GDP as another proxy for whether earnings were high or low and likely to reverse. In each case, the payout ratio's power survived. Of course, averaging in older earnings data or arbitrarily skipping a year reduced the statistical significance of our tests somewhat, but the *t*-statistics on payout defined in these ways were still quite striking (always greater than 3.0). The results for E/GDP were similar to the results reported in the text. The variable had the hypothesized negative sign but did not work nearly as well as the payout ratio and did not significantly reduce the payout ratio's power in bivariate tests.
17. Also recall from Figure 2 that our 10-year results held up well for 1871–1945.
18. Harvey found that the term structure of interest rates can account for more than half of the variation in GNP growth in many G–7 countries. He noted that this explanatory power is a great deal higher than the explanatory power offered by a model based on past GNP growth rates. He also found the term structure forecasts to compare favorably with alternative forecasts.
19. Because the earnings yield, *E/P*, is the reciprocal of P/E, if the P/E is 25, stocks are delivering \$1 of earnings for each \$25 of stock valuation, or a 4 percent earnings yield. We prefer using earnings yield to using P/E because it is more directly comparable with bond or cash yields, is more stable over time, and behaves more sensibly during times of deeply depressed earnings. If the earnings of a \$100 stock fall from \$5 a share to \$1 a share, the P/E is a relatively meaningless 100×; if earnings fall farther to a \$1 loss per share, the P/E is completely meaningless. In contrast, in these hypothetical cases, the earnings yield falls from 5 percent to 1 percent to –1 percent, all of which have a simple economic meaning: The earnings yield tells how much in earnings an investor can expect on each \$100 invested.
20. Campbell and Shiller (1998, 2001) found, similarly, that valuation ratios do a poorer job than fans of efficient markets might have expected of forecasting earnings growth, dividend growth, and productivity growth.
21. These results are also consistent with the company-by-company results of Titman, Wei, and Xie (2001) that companies that invest more tend to produce lower risk-adjusted returns. Like us, these authors also tested for and favored the empire-building story as an explanation for their counterintuitive results.
22. Some market observers have suggested that investors are more tolerant of equity market risk today and, therefore, valuation levels can easily be higher than in the past. Figure 5 also shows an exponential line of best fit (regression line) that may suggest that the "normal" P/E has risen by at least 25 percent over the past 130 years. This rise is a material change in fair value, which we think is entirely plausible, although it could also be a function of end points, notably the 2000 bubble. But in both panels, such a change would still place the "normal" P/E at just over half the recent levels.
23. The controversy covers both the efficacy of such options (do the positive incentives outweigh the negative ones?) and whether such options should be expensed (clearly, they should be).

References

Ambachtsheer, Keith P. 2001. "Investing without an Equity Risk Premium: A Brave New World?" *Ambachtsheer Letter*, #180 (January).

Arnott, Robert D., and Peter L. Bernstein. 2002. "What Risk Premium Is 'Normal'?" *Financial Analysts Journal*, vol. 58. no. 2 (March/April):64–85.

Arnott, Robert D., and William J. Bernstein. Forthcoming. "Earnings Growth: The 2% Dilution." *Financial Analysts Journal*.

Arnott, Robert D., and Ronald Ryan. 2001. "The Death of the Risk Premium: Consequences of the 1990s." *Journal of Portfolio Management*, vol. 27, no. 3 (Spring):61–74.

Arnott, Robert D., and James N. von Germeten. 1983. "Systematic Asset Allocation." *Financial Analysts Journal*, vol. 39, no. 6 (November/December):31–38.

Asness, Clifford. 2000a. "Bubble Logic or How to Learn to Stop Worrying and Love the Bull." Unpublished manuscript, AQR Capital Management (June).

———. 2000b. "Stocks versus Bonds: Explaining the Equity Risk Premium." *Financial Analysts Journal*, vol. 56, no. 2 (March/April):96–113.

Bagwell, Laurie Simon, and John B. Shoven. 1989. "Cash Distributions to Shareholders." *Journal of Economic Perspectives*, vol. 3, no. 3 (Summer):129–140.

Benartzi, Shlomo, Roni Michaely, and Richard Thaler. 1997. "Do Changes in Dividends Signal the Future or the Past?" *Journal of Finance*, vol. 52, no. 3 (July):1007–34.

Bernstein, Peter L. 1996. "What Prompts Paradigm Shifts?" *Financial Analysts Journal*, vol. 52, no. 6 (November/December):7–13.

———. 1997a. "How Long Can You Run—And Where Are You Running?" *Economics & Portfolio Strategy*. New York: Peter L. Bernstein, Inc. (February 15).

———. 1997b. "What Rate of Return Can You Reasonably Expect . . . or What Can the Long Run Tell Us about the Short Run?" *Financial Analysts Journal*, vol. 53, no. 2 (March/April):20–28.

———. 1997c. "Payouts and Payoffs and an Interesting Erratum." *Economics and Portfolio Strategy* (March 15).

———. 1998. "A Further Look at the Matter of Dividends." *Economics and Portfolio Strategy* (April 1).

———. 2001a. "Ending Endism." *Economics and Portfolio Strategy* (April 15).

———. 2001b. "The Real Economy and the Unreal Economy." *Economics and Portfolio Strategy* (May 1).

Boudoukh, Jacob, and Matthew Richardson. 1994. "The Statistics of Long-Horizon Regressions Revisited." *Mathematical Finance*, vol. 4, no. 2 (April):103–119.

Brealey, Richard A., and Stewart C. Myers. 2000. *Principles of Corporate Finance*, 6th ed. New York: McGraw Hill.

Campbell, John Y., and Robert J. Shiller. 1988. "Stock Prices, Earnings, and Expected Dividends." *Journal of Finance*, vol. 43, no. 3 (July):661–676.

———. 1998. "Valuation Ratios and the Long-Run Stock Market Outlook." *Journal of Portfolio Management*, vol. 24, no. 2 (Winter):11–26.

———. 2001. "Valuation Ratios and the Long-Run Stock Market Outlook: An Update." NBER Working Paper 8221 (April).

Chancellor, Edward. 1999. *Devil Take the Hindmost*. New York: Farrar, Straus, and Giroux.

Cole, Kevin, Jean Helwege, and David Laster. 1996. "Stock Market Valuation Indicators: Is This Time Different?" *Financial Analysts Journal*, vol. 52, no. 3 (May/June):56–64.

Cornell, Bradford. 1999. *The Equity Risk Premium*. New York: John Wiley & Sons.

Cowles, Alfred. 1939. *Common Stock Indexes: 1871–1937*. Bloomington, IN: Principia Press.

Fama, Eugene F., and Kenneth R. French. 1988. "Dividend Yields and Expected Stock Returns." *Journal of Financial Economics*, vol. 22, no. 1 (October):3–26.

———. 1989. "Business Conditions and Expected Returns on Stocks and Bonds." *Journal of Financial Economics*, vol. 25, no. 1 (July):23–50.

———. 1999. "Disappearing Dividends: Changing Firm Characteristics or Increased Reluctance to Pay?" Working paper.

———. 2002. "The Equity Premium." *Journal of Finance*, vol. 57, no. 2 (April):637–659.

French, Kenneth R., and James M. Poterba. 1991. "Were Japanese Stock Prices Too High?" *Journal of Financial Economics*, vol. 29, no. 2 (October):337–363.

Glassman, James K., and Kevin A. Hassett. 1999. *Dow 36,000*. New York: Random House.

Goetzmann, William N., and Philippe Jorion. 1993. "Testing the Predictive Power of Dividend Yields." *Journal of Finance*, vol. 48, no. 2 (June):663–679.

Gordon, Myron J. 1962. *The Investment Financing and Valuation of the Corporation*. Homewood, IL: Richard D. Irwin.

Goyal, Amit, and Ivo Welch. 1999. "Predicting the Equity Premium." Working paper.

Harvey, Campbell. 1991. "The Term Structure and World Economic Growth." *Journal of Fixed Income*, vol. 1, no. 1 (June):4–17.

Ibbotson Associates. 2001. *Stocks, Bonds, Bills and Inflation: 2000 Yearbook*. Chicago, IL: Ibbotson Associates.

Ibbotson, Roger G., and Peng Chen. 2003. "Long-Run Stock Returns: Participating in the Real Economy." *Financial Analysts Journal*, vol. 59, no. 1 (January/February):00–00.

Ibbotson, Roger, and Rex A. Sinquefield. 1976. "Stocks, Bonds, Bills and Inflation: Year-by-Year Historical Returns (1926–1974)." *Journal of Business*, vol. 49, no. 1 (January):11–47.

Jagannathan, Ravi, Ellen R. McGrattan, and Anna Scherbina. 2000. "The Declining U.S. Equity Premium." *Quarterly Review*. Federal Reserve Bank of Minneapolis (Fall).

Jensen, M.C. 1986. "Agency Costs of Free Cash Flow, Corporate Finance and Takeovers." *American Economic Review*, vol. 76, no. 2 (May):323–329.

Jensen, M.C., and William H. Meckling. 1976. "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." *Journal of Financial Economics*, vol. 3, no. 4 (October):305–360.

Lamont, Owen. 1998. "Earnings and Expected Returns." *Journal of Finance*, vol. 53, no. 5 (October):1563–87.

Lintner, John. 1956. "Distribution of Incomes of Corporations among Dividends, Retained Earnings, and Taxes." *American Economic Review*, vol. 46, no. 2 (May):97–113.

Macaulay, Frederick R. 1938. *Some Theoretical Problems Suggested by the Movements of Interest Rates, Bond Yields and Stock Prices in the United States since 1856.* Washington, DC: National Bureau of Economic Research.

McGrattan, Ellen R., and Edward C. Prescott. 2000. "Is the Stock Market Overvalued?" *Quarterly Review.* Federal Reserve Bank of Minneapolis (Fall).

Mehra, Rajnish. 2003. "The Equity Premium: Why Is It a Puzzle?" *Financial Analysts Journal*, vol. 59, no. 1 (January/February):00–00.

Merton, R.C. 1980. "On Estimating the Expected Return on the Market." *Journal of Financial Economics*, vol. 8, no. 4 (June):323–361.

Miller, Merton, and Franco Modigliani. 1961. "Dividend Policy, Growth and the Valuation of Shares." *Journal of Business*, vol. 34, no. 4 (October):411–433.

Miller, Merton, and Kevin Rock. 1985. "Dividend Policy under Asymmetric Information." *Journal of Finance*, vol. 40, no. 4 (September):1031–51.

Modigliani, F., and R. Cohn. 1979. "Inflation, Rational Valuation, and the Market." *Financial Analysts Journal*, vol. 35, no. 2 (March/April):24–44.

Modigliani, Franco, and Merton H. Miller. 1958. "The Cost of Capital, Corporation Finance, and the Theory of Investment." *American Economic Review*, vol. 48, no. 3 (June):261–297.

Newey, W., and K. West. 1987. "A Simple Positive-Definite Heteroscedasticity and Autocorrelation Covariance Matrix." *Econometrica*, vol. 55, no. 3:703–708.

Nissim, Doron, and Amir Ziv. 2001. "Dividend Changes and Future Profitability." *Journal of Finance*, vol. 56, no. 6 (December):2019–65.

Schwert, G. William. 1990. "Indexes of United States Stock Prices from 1802 to 1987." *Journal of Business*, vol. 63, no. 3 (July):399–426.

Shiller, Robert J. 1981. "Do Stock Prices Move Too Much to Be Justified by Subsequent Changes in Dividends?" *American Economic Review*, vol. 73, no. 3 (June):421–436.

———. 2000. *Irrational Exuberance*. Princeton, NJ: Princeton University Press.

Siegel, Jeremy J. 1998. *Stocks for the Long Run*. 2nd ed. New York: McGraw Hill.

Sorensen, Eric H., and Robert D. Arnott. 1988. "The Risk Premium and Stock Market Performance." *Journal of Portfolio Management*, vol. 14, no. 4 (Summer):50–55.

Titman, S., Wei, K.C. John, and Feixue Xie. 2001. "Capital Investments and Stock Returns." Working paper.

Welch, Ivo. 2000. "Views of Financial Economists on the Equity Premium and on Financial Controversies." *Journal of Business*, vol. 73, no. 4 (October):501–537.