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# The Adjusted Earnings Yield

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*The earnings yield, determined by the ratio of reported earnings to price, is frequently used to predict real return. Complications characterize the predictions, however, because reported earnings are not real. This research identifies an adjusted earnings yield that ensures that real return can be determined as a ratio of current-period prices. From freely accessible and publicly disseminated data, an adjusted-earnings-yield series is created for the U.S. equity market. Statistical tests indicate that this measure is a much better predictor of future real returns than are other popular valuation measures.*

Two correct methods are used for computing expected return. The first is to determine a nominal (inflation-affected) discount rate that equates the present value of the asset's nominal expected cash flows to its price. The second is to remove the effect of inflationary expectations on nominal cash flows and then determine a real discount rate that equates the present value of the asset's real expected cash flows to price. Economists frequently prefer the second method because real cash flows tend to be more stable and, therefore, easier to predict than their nominal counterparts. Investors should also focus on real expected returns because their typical concern is to improve purchasing power.

Consistent with this line of reasoning, the earnings yield (the reciprocal of the P/E) is commonly labeled a reasonable approximation of the real expected return to equity (see Siegel 2005 for a recent example). To see why, assume that the market value of equity, $S$, can be estimated by using the constant-growth dividend discount model (DDM) of Gordon (1962) presented in Equation 1, where $Div$ represents dividends and where expected return, $r$, and dividend growth, $g$, are both assumed real:

$$S = \frac{Div}{r - g}. \tag{1}$$

Rearranging the terms in Equation 1 results in

$$r = \frac{Div}{S} + g. \tag{2}$$

And it follows from Equation 2 that real expected return can be estimated as the dividend yield plus the growth rate in real dividends.

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Assume for the time being that reported earnings, $E$, are real. Replacing dividends in Equation 1 with the payout ratio, $p$, times earnings and assuming that all earnings can be reinvested at the real expected return results in

$$\begin{aligned} S &= \frac{pE}{r - \left[(1-p)r\right]} \\ &= \frac{E}{r}, \end{aligned} \tag{3}$$

where $g$ (the real growth rate) is determined as the retention rate, $1 - p$, times the reinvestment rate, $r$. Rearranging the terms in Equation 3 results in

$$r = \frac{E}{S}, \tag{4}$$

from which it follows that the earnings yield can be used to approximate real expected return.

The Gordon growth DDM is frequently used in the literature to estimate real expected return; see, for example, Arnott and Ryan (2001) and Arnott and Bernstein (2002). But the case is often made (see Damodaran 2006 for a recent example) that this model may underestimate real expected return if estimates for the dividend yield and real growth rate are based solely on forecasts for cash dividends and if share buybacks are expected to be a significant use of earnings.[1] Given current market conditions, this limitation deserves consideration. Mauboussin (2006) showed that aggregate share buybacks have exceeded cash dividends paid to shareholders in the United States in recent years.[2] For U.S. equities, cash dividends were 1.7 percent of market capitalization in 2005 whereas buybacks were 1.9 percent of market capitalization.

Stock buybacks and dividends are mathematically equivalent in an efficient market lacking taxes and other transaction costs and where identical reinvestment rates exist. But these assumptions rarely hold in practice. How, then, can we accurately assess the impact of share buybacks on expected return?

Readers should remember that the Gordon DDM and the earnings yield model (Equation 4) are equivalent as long as earnings are assumed to be reinvested at the real expected return. But as Equation 3 indicates, one benefit of using the earnings yield approach is that the payout ratio and the real growth rate are implicit in the determination of real expected return. This allows for the assumption that implicit in the market's determination of the earnings yield are a payout ratio and growth rate that correctly reflect the worth of cash dividends, share buybacks, and all other actions affecting shareholder return. Given that the funding for all of these activities is ultimately provided by earnings, I believe this assumption is reasonable. From my perspective, the earnings yield approach is superior to the Gordon DDM approach.

Complications exist, however, because in practice, reported earnings, $E$, are not real. They are affected by past and expected changes in the price level. A point that is crucial to this research is that if reported earnings are not real, then the expected return determined by using Equation 4 cannot be considered real because it is no longer a ratio of current-period prices. This research effort offers an *adjusted* earnings yield as a better measure of real expected return.

What adjustments to reported earnings are necessary? The first is an accounting adjustment, denoted $\alpha$. The reason this adjustment is necessary is that U.S. companies use historical-cost-accounting conventions allowed by GAAP when reporting their earnings to stockholders and to government regulatory agencies. Earnings measured in this manner cannot be considered real in the presence of changes in the price level. One area of concern is cost of goods sold when a significant time lag occurs between the purchase of inputs and the sale of finished goods. Another occurs if actual capital consumption differs from the consumption captured by the depreciation method used for reporting purposes.

An example will illustrate the importance of the accounting adjustment. Assume Company X is a new, all-equity-financed company with shareholder funds of $200 million. Company X purchases fixed assets of $100 million, which are depreciated over their economic life of two years by straight-line depreciation; the acquisition cost of these assets is the depreciable basis. In two years, these fixed assets will have a market value of zero and will cost $110 million to replace. Because the company follows GAAP, it reports depreciation expense of $50 million and after-tax profits of $30 million.

The $30 million Company X has reported as earnings cannot be considered a real measure of profitability. Depreciation expense fails to capture the cost of replacing fixed assets because it is based on the acquisition cost of those assets. For an estimate of earnings to be considered real, the company would have to determine depreciation expense by using a current-cost (sometimes called "replacement cost") accounting system. In such a system, the depreciable basis is the $110 million replacement cost of the fixed assets and the depreciation charge is $55 million a year (instead of $50 million). The accounting adjustment, $\alpha$, represents the after-tax adjustment needed to adjust GAAP-based reported earnings for price changes that affect the value of a company's assets and production inputs. The $\alpha$ adjustment for Company X in this example would be –$5 million.

The other necessary adjustment is for the impact of inflation on the real value of creditor claims. Modigliani and Cohn (1979) made the case that a significant portion of a company's interest expense actually represents compensation to lenders for the fact that the value of the principal returned to them will be lower in real terms because of inflation than what they lent. The GAAP-based earnings reported by leveraged companies thus overstate the true cost of debt because the data do not reflect the benefit that accrues to shareholders from being able to repay a fixed amount of principal with a currency that has been cheapened by inflation.

Ritter and Warr (2002) referred to this problem as the "debt capital gain error." They posited that the benefit of the decline in the real value of existing debt can easily be captured if a company simply keeps the real value of its debt constant. Doing so is accomplished by issuing new debt each period in the amount of the expected rate of inflation, $\rho$, times beginning-of-period debt, $D$. The net gain to shareholders reflects the fact that nominal interest on debt is a tax-deductible expense whereas the cash flow from issuing new debt is untaxed.

Another example will demonstrate the importance of the debt adjustment. Assume Company Y has assets worth $100 million that are financed with $60 million of debt and $40 million of equity. Company Y has zero real growth, and increases in its asset values are solely a result of inflation. Inflation is assumed to be perpetual and fully anticipated. The nominal cost of debt is 6 percent, which reflects a real cost of debt of 2 percent and an inflation premium of 4 percent that is equivalent to the expected rate of inflation.[3] Company Y's tax rate is 40 percent.

The nominal interest expense for Company Y in the current time period is $3.6 million, of which $1.2 million is the real cost of debt and $2.4 million represents compensation to creditors for the effects of inflation. Because interest is a tax-deductible expense, the after-tax cost to the shareholders for compensating creditors for the decline in the real value of their principal is $1.44 million.

In one year's time, inflation will cause the nominal value of Company Y's assets to rise by $4 million to $104 million. To maintain the current capital structure of 60 percent debt, Company Y issues an additional $\rho D$ or $2.4 million of debt, raising the total to $62.4 million. The cash flow from the new debt issue is untaxed, so the net gain to Company Y's shareholders is the $2.4 million of additional debt less the after-tax cost of $1.44 million for compensating creditors for inflation, or $960,000. Effectively, the tax code allows Company Y to expense the inflation compensation paid to creditors, yet the cash flow from issuing new debt is untaxed.

Given the limitations of reported earnings, the adjusted earnings yield presented in Equation 5 provides a more accurate way to estimate real expected return than the traditionally reported earnings yield because it takes the accounting and debt adjustments into account:[4]

$$r = \frac{E + \alpha + \rho D}{S}. \tag{5}$$

Equation 5 suggests that time periods may exist when the traditionally reported P/E and earnings yield will provide a poor estimate of the true worth of a stock. This outcome will occur any time the sum of accounting and debt adjustments cause adjusted earnings to vary significantly from earnings. As later sections will show, such periods occur much more frequently than not.

In the next section, I construct an adjusted-earnings-yield data series for the U.S. equity market that is consistent with Equation 5.

## Estimating the Real Expected Return for U.S. Equities

For this portion of the study, I used publicly disseminated data to construct an adjusted-earnings-yield data series for the U.S. equity market that is consistent with Equation 5. Because the data are freely accessible, the series can be easily used in the future.

For reported earnings, I used data for all nonfinancial companies provided in the National Income and Product Account (NIPA) and published by the Bureau of Economic Analysis (BEA). The BEA uses tax-accounting measures as the primary source of information on corporate profits for NIPA reporting because those measures are based on well-specified accounting definitions and do not allow corporations the same flexibility that GAAP provides for financial accounting.[5,6] These profit measures are derived largely from tax returns provided by the U.S. IRS Statistics of Income Corporation Income Tax Returns (available at www.irs.gov/taxstats/bustaxstats) and reflect the charges used in tax accounting for inventory withdrawals and depreciation.

The BEA then offers two adjustments to after-tax profits: (1) the inventory valuation adjustment (IVA) and (2) the capital consumption adjustment (CCAdj). The IVA converts the value of inventory withdrawals from a mixture of historical and current costs to a strict current-cost basis by removing the effects of prices from earlier periods. The CCAdj is the necessary adjustment for converting tax-return depreciation charges to the actual consumption of fixed capital. For this study, accounting adjustment $\alpha$ was computed as the sum of IVA and CCAdj as reported in the NIPA. Earnings, $E$, were defined as profits after taxes (without IVA and CCAdj) from the NIPA.

Data for credit market instruments issued by nonfinancial corporate businesses were used to determine $D$, the market value of debt. Credit market instruments include commercial paper, municipal securities, corporate bonds, bank loans, other loans and advances, and mortgages. Data for the market value of equities outstanding were used to determine $S$, the market value of equity. Both of these data series are available in the Federal Reserve Board statistical release Flow of Funds Accounts of the United States (www.federalreserve.gov/releases/).[7]

Data for the expected rate of inflation, $\rho$, came from the *Survey of Professional Forecasters* (www.phil.frb.org/econ/spf/), currently published by the Federal Reserve Bank of Philadelphia. The series represents the one-year-ahead inflation forecasts for the chain-weighted GDP price index, and it is the longest-running series of survey data for expected inflation.[8] In constructing the adjusted-earnings-yield series, I lagged the data for $D$ and $\rho$ one time period (quarter). The assumption was that company managers make the decision at the beginning of a quarter about how much new debt must be issued to maintain the real level of debt. The one-year-ahead inflation forecast for the chain-weighted GDP price index was divided by four to arrive at a quarterly rate for expected inflation.

Equation 5 is clearly a static model for determining real expected return. But as in the Fama–French (2002) use of the Gordon DDM, I assumed that the model is dynamic for the purposes of creating a time series. Although the BEA data begin in 1947 and the Federal Reserve data begin in 1952, the duration of the adjusted-earnings-yield time series was constrained to begin with the second quarter

(Q2) of 1970 for the one-year-ahead inflation forecasts for the chain-weighted GDP price index.

A graph of the adjusted earnings yield for Q3 1970 through Q3 2006 is in **Figure 1**. A five-year (20-quarter) moving average is included in Figure 1 to smooth the data. For comparison purposes, a traditional-earnings-yield series, defined as earnings divided by equity value, $E/S$, is also plotted in Figure 1 for the period Q3 1970 through Q3 2006.

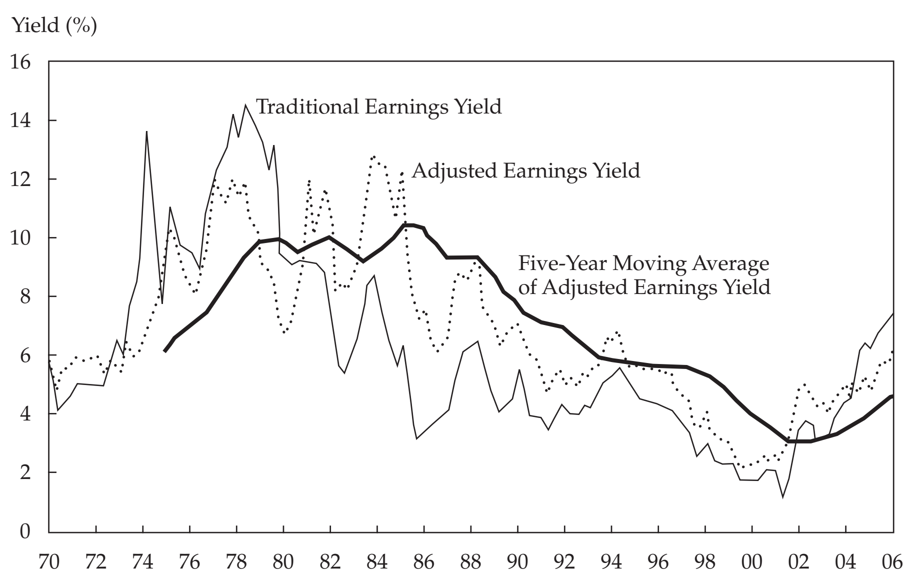
The adjusted earnings yield is typically, but not always, greater than the traditional earnings yield. The most important point in Figure 1 is that the adjusted earnings yield can differ significantly from the traditional earnings yield. What accounts for the 0.8 percentage point difference between the arithmetic averages of the two series? To examine this question, the contributions of the accounting adjustment, debt adjustment, and total adjustment are determined by using the following definitions:

- The accounting adjustment (as a percentage of the market value of equity) is $\alpha/S$;
- The debt adjustment (as a percentage of the market value of equity) is $\rho D/S$;
- The total adjustment (as a percentage of the market value of equity) is $\alpha/S + \rho D/S$.

The averages indicate that 0.1 percentage point of the difference between the average adjusted earnings yield and the average traditional earnings yield was contributed by the accounting adjustment and 0.7 percentage point was contributed by the debt adjustment. Care needs to be taken in interpreting this result, however, because the variability in the accounting adjustment exceeds that of the debt adjustment. The accounting adjustment varied from –8.3 percent to 5.0 percent, whereas the range of the debt adjustment was considerably less, varying from 0.1 percent to 1.8 percent. **Figure 2** presents plots of the accounting adjustment, debt adjustment, and total adjustment over the time period of this study. Note that the accounting adjustment accounts for most of the variability in the total adjustment and that the total adjustment can be quite significant.

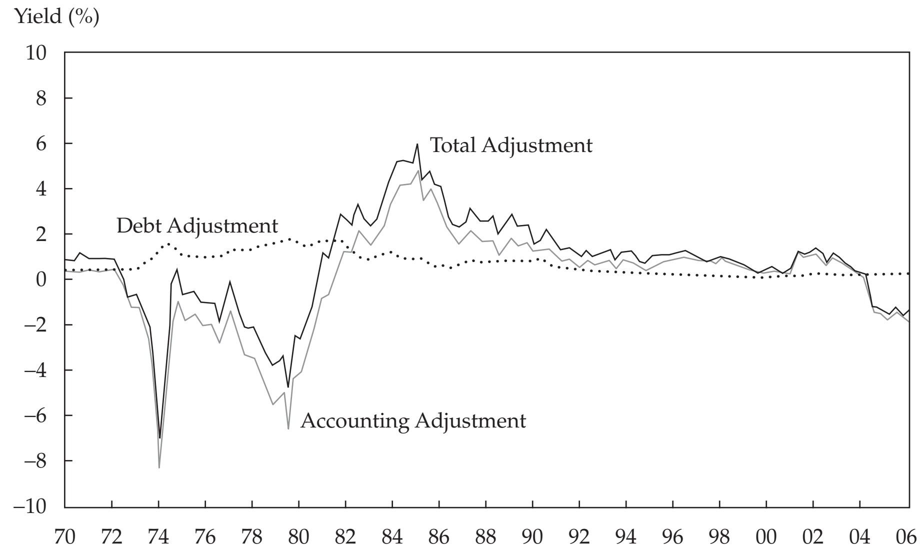
**Figure 3** presents plots of the adjusted earnings yield and the popularly reported earnings yield for the S&P 500 Index over the study period, although it is an apples-to-oranges comparison. The arithmetic average for the S&P 500 earnings yield was higher during the period than the adjusted earnings yield, but keep in mind that the S&P 500 is a large-capitalization index and its earnings yield is based on reported earnings. The adjusted earnings yield makes use of tax-reported earnings for all nonfinancial corporate businesses.

**Figure 1. Traditional Earnings Yield vs. Adjusted Earnings Yield: U.S. Equities, Q3 1970–Q3 2006**



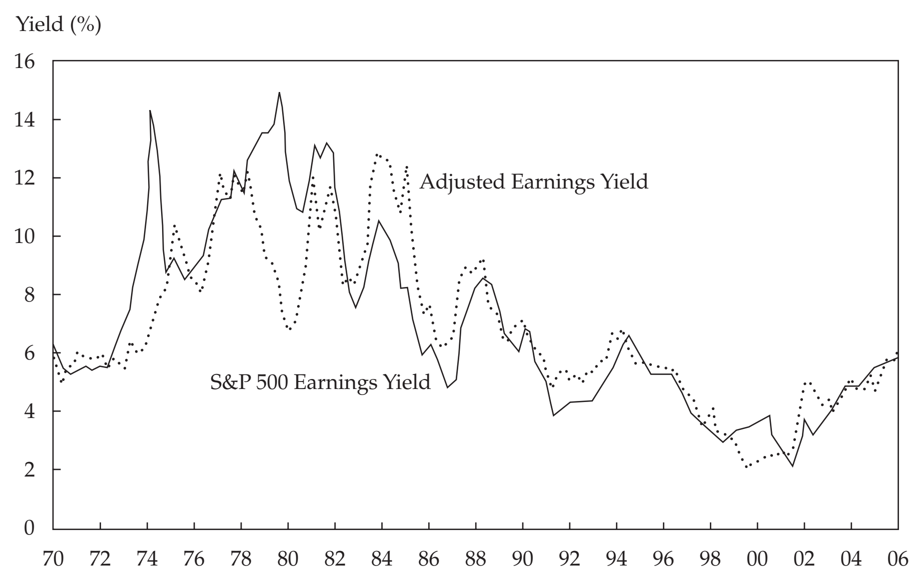

*Notes*: For the traditional earnings yield, the average is 6.0 percent, the standard deviation is 3.2 percent, the minimum is 1.1 percent, and the maximum is 14.6 percent. For the adjusted earnings yield, the average is 6.8 percent, the standard deviation is 2.6 percent, the minimum is 2.1 percent, and the maximum is 12.9 percent.

**Figure 2. Accounting Adjustment, Debt Adjustment, and Total Adjustment: U.S. Equities, Q3 1970–Q3 2006**




*Notes*: Adjustments as percentages of the market value of equity. For the debt adjustment, the average is 0.7 percent, the standard deviation is 0.5 percent, the minimum is 0.1 percent, and the maximum is 1.8 percent. For the accounting adjustment, the average is 0.1 percent, the standard deviation is 2.2 percent, the minimum is –8.3 percent, and the maximum is 5.0 percent. For the total adjustment, the average is 0.8 percent, the standard deviation is 2.1 percent, the minimum is –6.9 percent, and the maximum is 6.0 percent.

**Figure 3. S&P 500 Earnings Yield vs. Adjusted Earnings Yield, Q3 1970–Q3 2006**




*Notes*: For the S&P 500 earnings yield, the average is 7.0 percent, the standard deviation is 3.1 percent, the minimum is 2.2 percent, and the maximum is 15.0 percent. For the adjusted earnings yield, the average is 6.8 percent, the standard deviation is 2.6 percent, the minimum is 2.1 percent, and the maximum is 12.9 percent.

## Predictive Regressions

The objective of this section is to provide empirical evidence that the adjusted earnings yield is superior to other commonly used valuation measures as a predictor of future real equity returns. The predictive regression model used to test this hypothesis is

$$r_{i,t+1\to t+n} = \gamma_n + \lambda_n VM_{j,t} + \varepsilon_{i,j,t+n}, \quad (6)$$

where $VM_j$ denotes valuation measure $j$ and $t$ is the time-period indicator. Real expected returns are proxied by actual future real returns:

$$r_{i,t+1\to t+n} = \sum_{k=1}^{n} r_{i,t+k}, \quad (7)$$

where $r_{i,t+1\to t+n}$ is the $n$th-period continuously compounded (log) real return for equity index $i$. This methodology was notably used by Fama and French (1988) in their tests of the predictive power of the dividend yield.

The least-squares regression results for time horizons of $n$ = 1–8, 12, 16, 20, and 40 quarters will be reported. The traditional $t$-test statistics for these regressions are unreliable because of the serial correlation induced by the overlapping time periods used to compute returns. Therefore, I report Newey–West $t$-statistics, which correct for serial correlation.

Note that considerable debate is still going on about the statistical pitfalls associated with evaluating long-run stock market performance. Because valuation measures are tied to the stock price process, the regressor in a predictive regression has a (nearly) unit root. Authors have tried to mitigate this problem by using a variety of approaches. For example, Goetzmann and Jorion (1993) used bootstrapping, and Wolf (2000) used a "moving blocks" bootstrap to test predictive value. Torous, Valkanov, and Yan (2005) reported a variation of the $t$-statistic that corrects for the overlapping time periods once the uncertainty surrounding the order of integration has been taken into account.

Nevertheless, numerous well-researched studies have used valuation ratios as part of a prediction process for future long-run real returns; see, for example, Campbell and Shiller (1988, 1998, 2005). Making comparisons based on valuation ratios is also a common practice for most financial analysts, and the clear consensus within the investment industry is that this practice is worthwhile.

This study is on the side of that consensus, and although some statistical issues may exist with the results, I believe the evidence in this section suffices to establish the superiority of the adjusted earnings yield as a predictor of real equity returns, at least for the time period of this study.

I used quarterly observations for the CRSP value-weighted index as the starting input for determining the real return dependent variables. The construction of the index assumed dividends were reinvested in the index. The nominal index was adjusted for inflation by use of the chain-weighted GDP price index. Real returns were computed as the log of the ratio of the current quarter's real index value divided by the real index value from the previous quarter.[9]

The valuation measures used as explanatory variables in the regressions include the adjusted earnings yield, the S&P 500 dividend yield, the S&P 500 earnings yield, Shiller's earnings yield, and the reciprocal of $q$ (a ratio of stock market value to corporate net worth). The adjusted earnings yield was determined as noted in the preceding section. The S&P 500 dividend yield and earnings yield are based on trailing 12-month data. Earnings are top-down estimates for reported EPS. Values for the S&P 500 are end-of-quarter figures.

Shiller's earnings yield is defined as the reciprocal of Robert Shiller's price–earnings ratio, P/E(10) from *Irrational Exuberance* (2005). Quarterly data were gathered from the *Irrational Exuberance* website (www.irrationalexuberance.com/) and updated where necessary.

I followed a helpful recommendation from Andrew Smithers, co-author of the well-known *Valuing Wall Street* (Smithers and Wright 2000), to develop a quarterly series for $q$; $q$ was determined as the market value of equities outstanding for all nonfinancial corporate businesses divided by the difference between the value of their assets (with tangible assets valued at either market value or replacement cost) and the value of their liabilities. Data for this series came from Table B.102 of the Federal Reserve statistical release titled "Flow of Funds Accounts of the United States." I used the reciprocal of $q$ as an explanatory variable so that the signs of the coefficient estimates and test statistics for these regressions would be consistent with those that use the other explanatory variables.

Data are quarterly observations beginning in Q3 1970 and running through Q3 2006. The number of observations in each regression depended on the time horizon used to determine future real returns. **Table 1** reports the regression results.

The most intriguing empirical result is that the adjusted earnings yield is, by a significant margin, the best predictor of future real returns over the time period of this study. It is a much better predictor of near-term returns, and its coefficient estimate is statistically significant beginning at an investment horizon of two quarters. In contrast, the coefficient estimate for the S&P 500 dividend yield, the second-best predictor of real returns, is not statistically significant until an investment horizon of 12 quarters (three years).

**Table 1. Regression Results for Adjusted Earnings Yield vs. Other Measures: Dependent Variable = Log Real Returns for the CRSP Value-Weighted Index, Data for Q3 1970–Q3 2006**
(Newey–West *t*-statistics in parentheses)

| Regression Horizon | Adjusted Earnings Yield | | S&P 500 Dividend Yield | | S&P 500 Earnings Yield | | Shiller's Earnings Yield | | Reciprocal of $q$ | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Intercept | Yield | Intercept | Yield | Intercept | Yield | Intercept | Yield | Intercept | Reciprocal of $q$ |
| $n$ = 1 | –0.009782 | 0.394707 | –0.004276 | 0.671567 | 0.003043 | 0.200989 | 0.001693 | 0.229682 | –0.002755 | 0.012335 |
| | (–0.47) | (1.54) | (–0.21) | (1.18) | (0.18) | (0.90) | (0.09) | (0.96) | (–0.14) | (1.21) |
| $n$ = 2 | –0.024955 | 0.859720 | –0.013607 | 1.480718 | –0.000755 | 0.491708 | –0.000499 | 0.507881 | –0.009522 | 0.026784 |
| | (–0.64) | (1.77*) | (–0.35) | (1.37) | (–0.02) | (1.18) | (–0.01) | (1.11) | (–0.25) | (1.36) |
| $n$ = 3 | –0.044641 | 1.386174 | –0.017889 | 2.118644 | –0.001260 | 0.730790 | 0.001855 | 0.712951 | –0.010877 | 0.037654 |
| | (–0.82) | (2.08**) | (–0.32) | (1.41) | (–0.03) | (1.28) | (0.04) | (1.13) | (–0.20) | (1.38) |
| $n$ = 4 | –0.064887 | 1.918387 | –0.020953 | 2.714077 | –0.000177 | 0.946279 | 0.003277 | 0.930289 | –0.011745 | 0.048169 |
| | (–0.94) | (2.35**) | (–0.29) | (1.46) | (–0.00) | (1.36) | (0.05) | (1.19) | (–0.17) | (1.41) |
| $n$ = 5 | –0.080862 | 2.388814 | –0.025218 | 3.350723 | 0.000452 | 1.171035 | 0.003982 | 1.160727 | –0.012373 | 0.058639 |
| | (–0.99) | (2.52**) | (–0.29) | (1.54) | (0.01) | (1.46) | (0.05) | (1.28) | (–0.15) | (1.46) |
| $n$ = 6 | –0.093985 | 2.812791 | –0.027798 | 3.921442 | 0.003429 | 1.357117 | 0.006302 | 1.361362 | –0.009926 | 0.066980 |
| | (–1.01) | (2.65***) | (–0.28) | (1.60) | (0.04) | (1.51) | (0.07) | (1.35) | (–0.10) | (1.46) |
| $n$ = 7 | –0.097732 | 3.093173 | –0.025336 | 4.324109 | 0.010315 | 1.482967 | 0.011739 | 1.511051 | –0.003735 | 0.072808 |
| | (–0.94) | (2.65***) | (–0.22) | (1.59) | (0.11) | (1.51) | (0.11) | (1.36) | (–0.03) | (1.43) |
| $n$ = 8 | –0.092546 | 3.249513 | –0.017143 | 4.561351 | 0.022615 | 1.537972 | 0.022522 | 1.588447 | 0.007943 | 0.075527 |
| | (–0.81) | (2.59**) | (–0.13) | (1.53) | (0.22) | (1.45) | (0.20) | (1.31) | (0.06) | (1.35) |
| $n$ = 12 | –0.079871 | 3.986494 | –0.013278 | 6.382181 | 0.044428 | 2.145766 | 0.039560 | 2.276495 | 0.030569 | 0.101132 |
| | (–0.57) | (2.60**) | (–0.09) | (1.77*) | (0.34) | (1.67*) | (0.27) | (1.52) | (0.19) | (1.43) |
| $n$ = 16 | –0.070455 | 4.806537 | –0.023170 | 8.677837 | 0.060333 | 2.860046 | 0.047726 | 3.131079 | 0.047733 | 0.132017 |
| | (–0.46) | (2.90***) | (–0.14) | (2.37**) | (0.41) | (1.96*) | (0.30) | (1.98*) | (0.27) | (1.72*) |
| $n$ = 20 | –0.055791 | 5.735664 | –0.051606 | 11.90845 | 0.091509 | 3.552353 | 0.066248 | 4.038910 | 0.065213 | 0.171355 |
| | (–0.34) | (3.36***) | (–0.32) | (3.44***) | (0.53) | (2.06**) | (0.40) | (2.47**) | (0.35) | (2.15**) |
| $n$ = 40 | 0.244355 | 7.844818 | 0.320866 | 14.25989 | 0.508130 | 4.356728 | 0.500445 | 4.532655 | 0.364915 | 0.264353 |
| | (0.97) | (3.07***) | (1.24) | (2.77***) | (2.34**) | (2.28**) | (2.23**) | (2.33**) | (1.71*) | (3.23***) |

*Notes*: The regression model is Equation 6, with $r_{i,t+1 \rightarrow t+n}$ defined by Equation 7. Data are quarterly. The number of observations in each regression depended on the time horizon used to determine future real returns.

*Significant at the 10 percent level.
**Significant at the 5 percent level.
***Significant at the 1 percent level.

## Contribution of Each Adjustment

If the goal is to forecast real equity returns, the accounting adjustment and the debt adjustment that are made to determine the adjusted earnings yield are important considerations. To test this hypothesis, I used this predictive regression model:

$$r_{i,t+1\rightarrow t+n} = \gamma_n + \sum_{j=1}^{s} \lambda_{n,j} F_{j,t} + \varepsilon_{i,j,t+n}, \quad (8)$$

where $F_j$ denotes factor $j$. Real expected returns were proxied by actual future real returns for equity index $i$ (the CRSP value-weighted index) and were determined by

$$r_{i,t+1\rightarrow t+n} = \sum_{k=1}^{n} r_{i,t+k}. \quad (9)$$

I ran four regressions at each time horizon $n$ = 4, 8, 12, 16, 20, and 40 quarters. The four regressions varied by the explanatory variables or factors $F_{j,t}$ used in each regression: in the first regression, the adjusted earnings yield; in the second, the traditional earnings yield ($E/S$); in the third, the traditional earnings yield and the total adjustment ($\alpha/S + \rho D/S$); in the fourth regression, the traditional earnings yield, the accounting adjustment ($\alpha/S$), and the debt adjustment ($\rho D/S$). All explanatory variables were determined as indicated in the section "Estimating the Real Expected Return for U.S. Equities." The results of the regressions, including Newey–West $t$-statistics, are reported in **Table 2**.

These regression results clearly show the importance of the adjustments. A review of the results of the third regression indicates that the coefficient estimate for the total adjustment variable is statistically significant at the 1 percent level for all of the time horizons under consideration. A review of the results of the fourth regression indicates that the coefficient estimate for the accounting adjustment variable is statistically significant at the 1 percent level for all time horizons under consideration. The coefficient estimate for the debt adjustment variable is statistically significant at the 10 percent level at a time horizon of 20 quarters and at the 1 percent level at a time horizon of 40 quarters.

Interestingly, the debt adjustment is more highly positively correlated with future real returns than is the accounting adjustment and the difference increases with the length of the investment horizon. In contrast, the regression results in Table 2 show that the accounting adjustment is more important than the debt adjustment as a predictor of future real returns. This result may be influenced, however, by the fact that the accounting adjustment is negatively correlated with the traditional earnings yield and the debt adjustment whereas the debt adjustment is positively correlated with the traditional earnings yield. Correlation matrices for the fourth regression results for each time horizon are presented in **Table 3**.

## Extension of Time Series and Comparison with P/E(10)

The adjusted-earnings-yield series used in the previous sections was constrained by data availability for the expected rate of inflation. Although the *Survey of Professional Forecasters* is the longest-running series of survey data for expected inflation, unfortunately, the series dates back only to 1970. Even if a longer series of survey data for expected inflation were available, the length of an adjusted-earnings-yield time series would still be limited because Federal Reserve data begin only in 1952.

To somewhat address these concerns, in this section, I compare a variant of the adjusted-earnings-yield series with Shiller's P/E(10), which has become a widely popular measure of market valuation.[10] Based on recommendations from Graham and Dodd (1934), Shiller defined the numerator of P/E(10) as the real S&P 500 and the denominator as the moving average of the preceding 10 years of real reported earnings. The CPI was used to adjust for inflation.

The *Survey of Professional Forecasters* began collecting survey data for expected CPI inflation in Q3 1981. To be consistent with Shiller's use of the CPI, I used these data for the estimate of expected inflation, $\rho$, from Q3 1981 to Q3 2006. To construct a data series for expected inflation that dates back to 1952, I assumed that investors had *perfect foresight* prior to Q3 1981 and that the rate of expected inflation is the actual year-ahead percentage change in the CPI. Thus, the expected rate of inflation in this section reflects the actual year-ahead percentage change in the CPI from Q1 1952 through Q2 1981 and then reflects survey data for expected CPI inflation from Q3 1981 to Q3 2006. These actual and expected annual inflation rates were divided by four to arrive at a quarterly rate for $\rho$.

To closely match Shiller's methodology, I constructed an "adjusted-earnings-yield(10)" [or "AEY(10)"] series in which the numerator was the moving average of the preceding 10 years (40 quarters) of real adjusted earnings for all nonfinancial companies and the denominator was the real value of equities outstanding. The data inputs were the same as used in previous sections except, as noted, for the estimate of expected inflation. Following Shiller, I used the CPI to adjust for inflation when determining the moving average of real adjusted earnings and real equity value. The reciprocal of AEY(10) is presented in **Figure 4** and compared

**Table 2. Regression Results Showing Importance of Adjustments: Dependent Variable = Log Real Returns for the CRSP Value-Weighted Index, Q3 1970–Q3 2006**
(Newey–West *t*-statistics in parentheses)

| | | Coefficient Estimates | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Regression Horizon | Regression Number | Intercept | Adjusted Earnings Yield | Traditional Earnings Yield | Total Adjustment | Accounting Adjustment | Debt Adjustment | $R^2$ |
| $n = 4$ | 1 | –0.064887 | 1.928387 | | | | | 0.086146 |
| | | (–0.94) | (2.35**) | | | | | |
| | 2 | 0.0277735 | | 0.638241 | | | | 0.013926 |
| | | (0.54) | | (1.01) | | | | |
| | 3 | –0.070475 | | 1.823411 | 3.297410 | | | 0.115909 |
| | | (–1.05) | | (2.34**) | (3.03***) | | | |
| | 4 | –0.078877 | | 2.324465 | | 2.865498 | 0.193642 | 0.117900 |
| | | (–1.21) | | (1.59) | | (2.87***) | (0.02) | |
| $n = 8$ | 1 | –0.092546 | 3.249513 | | | | | 0.128211 |
| | | (–0.82) | (2.59**) | | | | | |
| | 2 | 0.058798 | | 1.202437 | | | | 0.025994 |
| | | (0.68) | | (1.22) | | | | |
| | 3 | –0.103946 | | 3.133362 | 5.367359 | | | 0.163477 |
| | | (–0.95) | | (2.68***) | (3.39***) | | | |
| | 4 | –0.115954 | | 3.925675 | | 5.712586 | 0.353204 | 0.166029 |
| | | (–1.14) | | (1.92*) | | (3.36***) | (0.03) | |
| $n = 12$ | 1 | –0.079871 | 3.986494 | | | | | 0.129083 |
| | | (–0.57) | (2.60**) | | | | | |
| | 2 | 0.109722 | | 1.441125 | | | | 0.025242 |
| | | (0.98) | | (1.17) | | | | |
| | 3 | –0.094174 | | 3.847670 | 6.581672 | | | 0.165227 |
| | | (–0.69) | | (2.67***) | (3.69***) | | | |
| | 4 | –0.089933 | | 3.546079 | | 6.452958 | 8.518377 | 0.165481 |
| | | (–0.74) | | (1.50) | | (3.46***) | (0.51) | |
| $n = 16$ | 1 | –0.070455 | 4.806537 | | | | | 0.150607 |
| | | (–0.46) | (2.90***) | | | | | |
| | 2 | 0.151313 | | 1.882812 | | | | 0.034733 |
| | | (1.23) | | (1.43) | | | | |
| | 3 | –0.084020 | | 4.652491 | 7.462970 | | | 0.181997 |
| | | (–0.57) | | (2.93***) | (4.12***) | | | |
| | 4 | –0.052750 | | 2.333513 | | 6.477759 | 22.46841 | 0.194404 |
| | | (–0.42) | | (0.94) | | (4.08***) | (1.19) | |
| $n = 20$ | 1 | –0.055701 | 5.735664 | | | | | 0.178512 |
| | | (–0.34) | (3.36***) | | | | | |
| | 2 | 0.200787 | | 2.433173 | | | | 0.048777 |
| | | (1.49) | | (1.70*) | | | | |
| | 3 | –0.065704 | | 5.566808 | 8.152028 | | | 0.201893 |
| | | (–0.41) | | (3.32***) | (4.09***) | | | |
| | 4 | –0.006885 | | 1.348150 | | 6.348524 | 35.24177 | 0.237444 |
| | | (–0.05) | | (0.53) | | (3.95***) | (1.81*) | |
| $n = 40$ | 1 | 0.244355 | 7.844818 | | | | | 0.217341 |
| | | (0.97) | (3.07***) | | | | | |
| | 2 | 0.708637 | | 2.168705 | | | | 0.031558 |
| | | (3.86***) | | (1.33) | | | | |
| | 3 | 0.240110 | | 7.590348 | 10.39925 | | | 0.247237 |
| | | (0.95) | | (2.91***) | (3.28***) | | | |
| | 4 | 0.343149 | | –0.745911 | | 2.889413 | 64.94557 | 0.396982 |
| | | (1.66*) | | (–0.26) | | (3.95***) | (3.24***) | |

*Notes*: The predictive regression model is Equation 8, with $r_{i,t+1 \rightarrow t+n}$ defined by Equation 9. Data are quarterly.

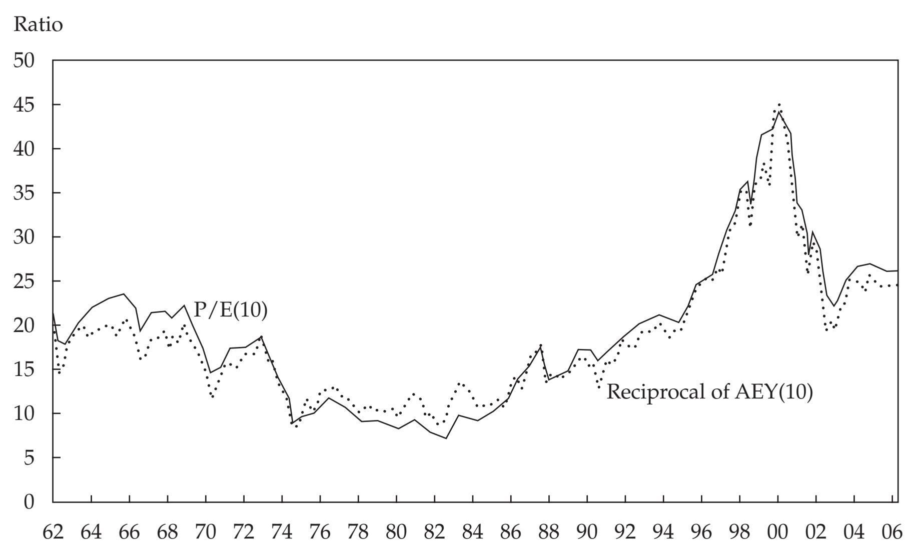
*Significant at the 10 percent level.
**Significant at the 5 percent level.
***Significant at the 1 percent level.

**Table 3. Correlation Matrices for Regression 4 Results in Table 2**

| | Real Returns: Next *n* Quarters | Traditional Earnings Yield | Accounting Adjustments | Debt Adjustments |
|---|---|---|---|---|
| *Next n = 4 quarters* | 1.0 | 0.118010 | 0.147118 | 0.156452 |
| Traditional earnings yield | | 1.000000 | –0.701247 | 0.838239 |
| Accounting adjustment | | | 1.000000 | –0.463755 |
| Debt adjustment | | | | 1.000000 |
| *Next n = 8 quarters* | 1.0 | 0.161227 | 0.151645 | 0.196400 |
| Traditional earnings yield | | 1.000000 | –0.705133 | 0.848546 |
| Accounting adjustment | | | 1.000000 | –0.488794 |
| Debt adjustment | | | | 1.000000 |
| *Next n = 12 quarters* | 1.0 | 0.158877 | 0.147755 | 0.225203 |
| Traditional earnings yield | | 1.000000 | –0.707360 | 0.848355 |
| Accounting adjustment | | | 1.000000 | –0.493962 |
| Debt adjustment | | | | 1.000000 |
| *Next n = 16 quarters* | 1.0 | 0.186369 | 0.125234 | 0.296665 |
| Traditional earnings yield | | 1.000000 | –0.707645 | 0.844991 |
| Accounting adjustment | | | 1.000000 | –0.492274 |
| Debt adjustment | | | | 1.000000 |
| *Next n = 20 quarters* | 1.0 | 0.220855 | 0.096318 | 0.367356 |
| Traditional earnings yield | | 1.000000 | –0.710896 | 0.839067 |
| Accounting adjustment | | | 1.000000 | –0.488395 |
| Debt adjustment | | | | 1.000000 |
| *Next n = 40 quarters* | 1.0 | 0.177647 | 0.114663 | 0.469874 |
| Traditional earnings yield | | 1.000000 | –0.773720 | 0.785862 |
| Accounting adjustment | | | 1.000000 | –0.518333 |
| Debt adjustment | | | | 1.000000 |

**Figure 4. Reciprocal of AEY(10) Compared with P/E(10), Q1 1962–Q3 2006**



with quarterly observations of Shiller's P/E(10). Because of the 10-year moving average, the time period in Figure 4 is Q1 1962 through Q3 2006.

The reciprocal of AEY(10) closely tracks P/E(10), but the values for P/E(10) are typically somewhat higher than the values for the reciprocal of AEY(10). The average for P/E(10) is 19.2; the average for the reciprocal of AEY(10) is 18.2. Both series are consistent with Shiller's contention that the U.S. equity market was significantly overvalued in the late 1990s. And both series are consistent with Shiller's contention that future real equity returns should be lower than what they have been in the past.[11]

I recommend, however, that users not apply the Graham and Dodd methodology to the adjusted-earnings-yield series. A review of monthly data for the period January 1881 through September 2006 (1,509 observations) that were used in *Irrational Exuberance* and that I updated as needed indicated that, on average, real earnings in the period exceeded the 10-year moving average by 8.9 percentage points. This discrepancy undoubtedly reflects the real growth in corporate earnings. Although it does not create a major problem when evaluating P/E(10) as a time series as Shiller used the methodology, it may be a problem if the goal is to use some variation of the earnings yield to estimate real expected return.

Equation 4 indicates that real expected return must be determined as a ratio of current-period prices. If some smoothing of the adjusted-earnings-yield time series is necessary, I recommend using a relatively short moving average of the series (current-period adjusted earnings divided by current-period equity value). Figure 1 provides visual evidence that there is little reason to smooth the data beyond a five-year (20-quarter) moving average.

## Conclusion

This research has made the case that the adjusted earnings yield provides a reasonable estimate of real expected return. Adjustments are made to earnings to (1) convert them to a current-cost (replacement-cost) basis and (2) reflect the benefit that accrues to shareholders from repaying debt with a currency that has been cheapened by inflation. These adjustments are necessary to ensure that expected return is determined as a ratio of current-period prices and can, therefore, be considered real.

Because the adjusted earnings yield is a measure of real expected return, it suffices as a standalone measure and investors should be most concerned with its level. The equity market should be expected to perform better when its adjusted earnings yield is high and perform not as well when the yield is low.[12] Importantly, the adjusted-earnings-yield measure created for the U.S. equity market in this research effort has been shown to be a much better predictor of near-term real equity returns than other popular valuation measures.

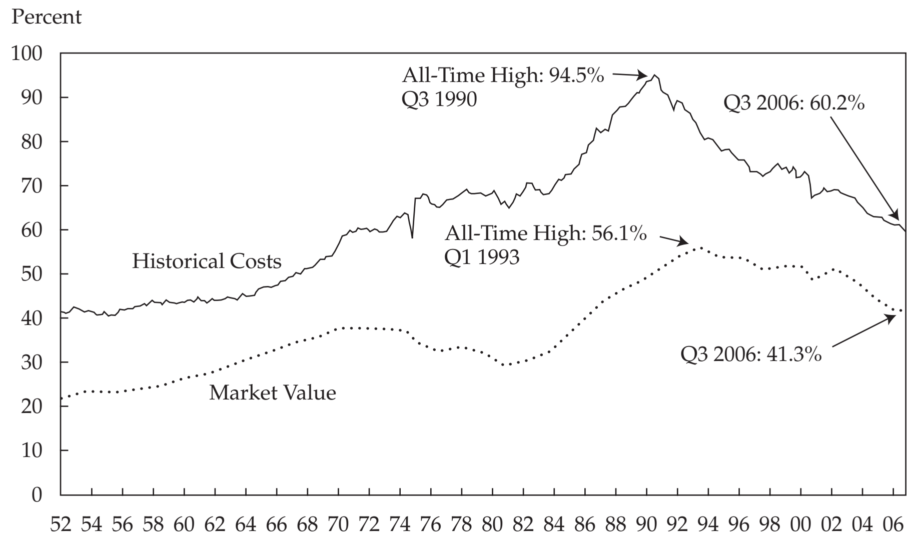
**Investor Behavior.** Can the adjusted-earnings-yield series developed in this article reveal anything about investor behavior? Siegel (2002) presented a thorough and now famous analysis of stock market data indicating that stocks have returned just short of 7.0 percent after inflation over the past 200 years. The annualized (geometric) average real return for the CRSP value-weighted index for the time period of this study was 6.6 percent, which is comparable to Siegel's results.[13] Real returns, however, varied considerably over the time period of this study. From Q1 1970 to Q2 1982 (before the start of the great U.S. equity bull market), the annualized (geometric) average real return for the CRSP value-weighted index was –0.9 percent. From Q3 1982 through Q1 2000, it was 15.5 percent.

An explanation commonly offered for the low real returns of the 1970s and the high real returns of the 1980s and 1990s is that investors were simply behaving irrationally. The results of this study, however, suggest that a plausible, albeit only partial, explanation of why real returns varied as they did is that market participants rationally recognized that traditional measures of market valuation, such as P/E or the earnings yield, were misstating the true worth of equities. For example, Figure 1 indicates that the adjusted earnings yield was significantly higher in the early 1980s through early 1990s than the traditional earnings yield. It also indicates that the adjusted earnings yield was frequently lower than the traditional earnings yield in the 1970s. Although readers should understand that I am not offering a full explanation for all of the excesses of the U.S. equity market, the case can be made that the variation in real returns appears to be somewhat more rational once the accounting and debt adjustments are considered.

**Corporate Debt.** The U.S. economy is frequently characterized as debt-ridden. The debt ratios for nonfinancial corporations, however, are either close to or below their long-term averages. **Figure 5** presents two measures of the ratio of credit market instruments to net worth for data from Q1 1952 through Q3 2006. Net worth is based on the acquisition cost of assets in one of the series and on the market value of assets in the other series. Note that the ratios of credit market instruments to net worth were at their highest levels in the early 1990s and are now considerably lower.

**Figure 5. Ratio of Credit Market Instruments to Net Worth, Q1 1952–Q3 2006**

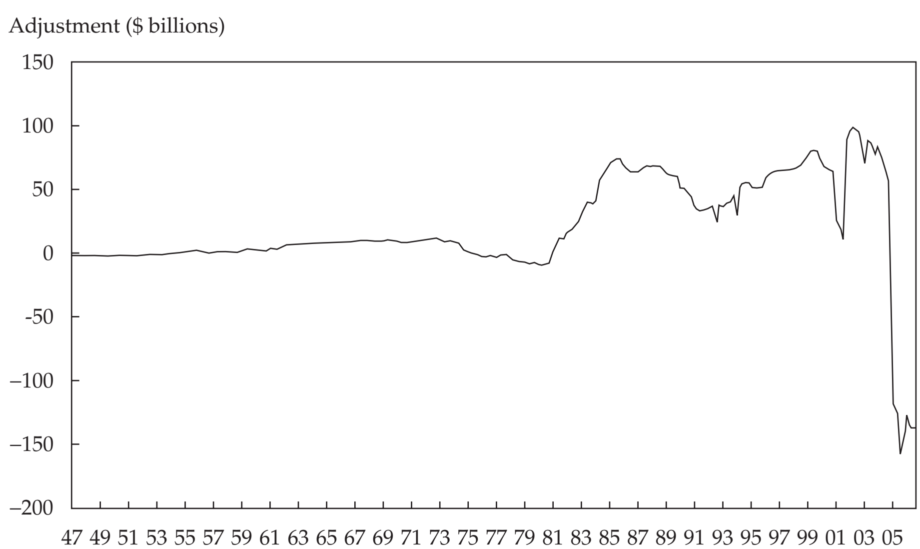



The benefits of additional debt financing can be realized only if a company is willing to increase its financial risk, but too much borrowing can adversely affect the share price. Nevertheless, the evidence in Figure 5 is compelling: Given the low risk-free interest rates and credit spreads at the time this research was written, some companies may be well served if they increase the proportion of debt financing in their capital structures.

The adjusted-earnings-yield formula given in Equation 5 suggests that debt may contribute positively to real expected return. Green and Jegadeesh (2006) recently examined all publicly traded nonfinancial companies from 1974 to 2005 and found that companies with high debt levels relative to their peers boasted superior stock market returns. The authors suggested, however, that high levels of debt signal that management believes the company's stock price is undervalued by the market.

**Corporate Fixed Investment.** The traditional earnings yield exceeded the adjusted earnings yield at the end of Q3 2006 (see Figure 1). The primary reason is the capital consumption adjustment, which effectively represents the difference between tax-return depreciation charges and the actual consumption of fixed capital. The plot of the CCAdj in **Figure 6** indicates the actual consumption of fixed capital has recently exceeded that expensed for tax purposes by a considerable amount.

**Figure 6. Capital Consumption Adjustment, Q1 1947–Q3 2006**



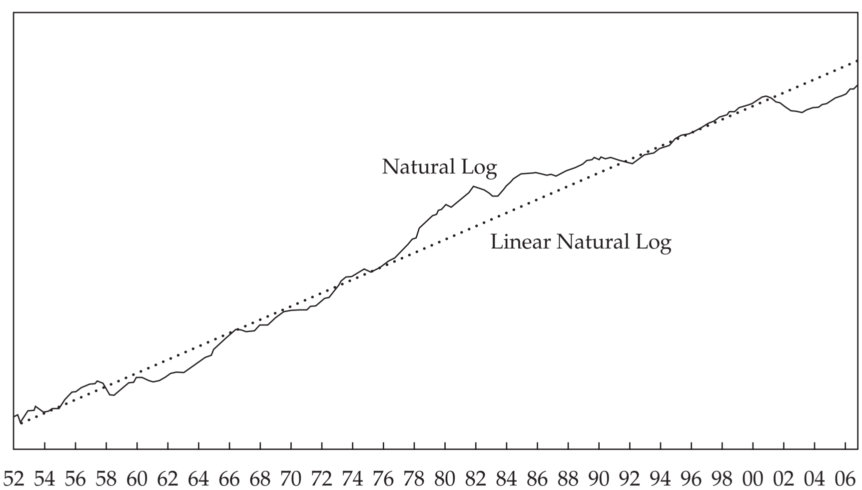
Some of this large difference can probably be attributed to the accelerated depreciation methods allowed for tax purposes.[14] Some of the difference can also be attributed, however, to companies' underinvestment in fixed capital. **Figure 7** shows the natural logarithm of private nonresidential fixed investment for nonfinancial corporations and the linear trend line for this series. Figure 7 indicates that capital investment has been well below trend since Q4 2001. The short-run effect of underinvestment is an increase in profits, and profits are now their biggest share of the U.S. economy since 1950. The bad news is that underinvestment will eventually weaken companies' long-term financial health. The accounting adjustments made in determining the adjusted earnings yield capture the impact of these sorts of problems.

**Forecast of Real Returns for U.S. Equities.** As of Q3 2006, the adjusted earnings yield was predicting a real return to U.S. equities of 6.1 percent. A more conservative estimate of 4.7 percent is provided by the five-year moving average of the series. Although these forecasts are both below the historical long-run real return of U.S. equities, they are fairly consistent with other recent forecasts. Interestingly, Ibbotson and Chen (2003), using a sophisticated supply-side approach first applied by Diermeier, Ibbotson, and Siegel (1984), estimated a 6.09 percent real return to equities conditional on the historical average risk-free rate. More recently, Siegel (2005), based to a great extent on the S&P 500 P/E, forecasted real stock returns of 5.5–6.0 percent for that index.

Forecasts of real returns change quarterly with the arrival of new data. Data for the adjusted-earnings-yield series developed for the U.S. equity market in this research effort as well as updated forecasts for real return are available at www.business.mnsu.edu/wilcox.

*This article qualifies for 1 PD credit.*

**Figure 7. Natural Log(Nonresidential Fixed Investment for Nonfinancial Corporate Business), Q1 1952–Q3 2006**




## Notes

1. In his 1984 annual letter to investors in Berkshire Hathaway, Warren Buffett wrote that for companies with outstanding businesses, solid financials, and an undervalued stock, "no alternative action can benefit shareholders as surely as share repurchases." (Available online at www.berkshirehathaway.com/letters/1984.html.)
2. Mauboussin cited corporate reports, Empirical Research Partners, Bernstein Research, FactSet Research Systems, and Legg Mason Capital Management estimates as sources for these data.
3. For simplicity, I assume that the nominal rate of interest is the real rate of interest plus the expected rate of inflation. I have ignored the cross-product term from the well-known Fisher (1930) effect.
4. Credit for Equation 5 should largely be given to Modigliani and Cohn (1979). They identified the necessary debt adjustment, $\rho D$, with mathematical rigor, and the importance of the accounting adjustment can be inferred from their assumptions. The presentation in this article differs from that of Modigliani and Cohn in its mathematical simplicity and in that it allows for real growth (because of the reinvestment rate assumption preceding Equation 3) and taxes. The fact that the Modigliani–Cohn debt adjustment is unaffected by taxes was recognized by Ritter and Warr (2002), as noted in the previous discussion and example.
5. Because financial accounting measures are available on a quarterly basis, the BEA uses them to extrapolate annual tax return–based estimates to current periods.

6. An important benefit of using tax-accounting earnings data is that companies have an obvious incentive to be conservative in reporting their taxable income. Therefore, to assume these types of earnings estimates are of higher quality than reported earnings is reasonable. Desai (2003) found substantial differences between book income and tax income.
7. The match between the BEA and Federal Reserve data appears to be good but not perfect. I assumed that any differences between BEA and Federal Reserve data are minor and can be ignored.
8. The BEA switched from a fixed-base-year method to simplified chain weighting in 1995, primarily because of a dramatic fall in computer prices. The BEA calculates growth for a year itself and for the preceding year. The chain-weighted growth for a year is an average of the two.
9. All the regressions in this section were also carried out with real returns for the S&P 500 used as the dependent variable, with results that are substantially the same as those reported for the CRSP value-weighted index.
10. Comparisons with Shiller's work in this study were included primarily at the request of an anonymous referee. No criticism is intended, and all readers should understand that I view Shiller's contributions as very valuable and timely. My views are similar for the contributions of Smithers and Wright (2000).
11. A predictive regression analysis similar to that described previously indicated that the reciprocal of AEY(10) is a superior predictor of real returns than is P/E(10). Incorporating a moving average of real adjusted earnings introduces another empirical problem, however, because the explanatory variable now reflects data from overlapping periods. Using the actual inflation rate to determine real adjusted earnings and real returns is also problematic.
12. To make comparisons between the adjusted earnings yield and any inflation-affected market interest rate would be an error. It would be similar to the mistake made by advocates of the Fed model, which relates the earnings yield on the S&P 500 to the yield on the 10-year U.S. T-bond. The Fed model has justifiably drawn a slew of critics (to mention but a few, see Asness 2003, 2005; Shiller 2005; Campbell and Vuolteenaho 2004; Siegel 2002).
13. The real return computation used the chain-weighted GDP price index to deflate the quarterly values of the CRSP value-weighted index. Siegel used various indices to determine returns and the CPI to adjust for inflation.
14. Accelerated depreciation methods for tax accounting have been in place since 1954. The current Modified Accelerated Cost Recovery System has been in place since 1986 (with some revisions). Following the terrorist attacks of 11 September 2001, the U.S. Congress enacted the Job Creation and Worker Assistance Act of 2002, which temporarily changed how depreciation is charged for property acquired after 10 September 2001 and before 11 September 2004 and was put in service before 1 January 2005. The act gave companies the option of charging an additional 30 percent of their original basis to Year 1 depreciation.

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