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Adjusted Earnings Yields and Real Rates of Return

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An accurate forecast of real return requires that accounting and debt adjustments be made to reported earnings. This article presents methodologies that investors can use to estimate the accounting and debt adjustments for individual companies and offers evidence, derived from a predictive regression model, that investors should consider these adjustments important. The article also reviews the use of nonfinancial corporate debt and makes the case that investors should view the use of debt by nonfinancial companies more positively than they currently do.

Wilcox (2007) showed that an adjusted-earnings-yield measure created for the U.S. equity market is a much better predictor of real equity returns than are other popular market valuation ratios. The formula for the adjusted earnings yield is presented in Equation 1 (subscripts indicate the period in which a cash flow or valuation occurs):

$$R = \frac{NI_0 + \alpha_0 + \rho D_0}{S_0}, \quad (1)$$

where

R = the real expected return
NI_0 = reported net income
α_0 = the accounting adjustments
ρD_0 = the debt adjustment, where ρ is the expected rate of inflation and D_0 is debt
S_0 = the market value of the company's equity

Note that the adjusted earnings yield provides an approximation of the real, not nominal, return. For R to be considered real in Equation 1, it must be determined as a ratio of current prices. Although the market value of the company's equity, S_0, is real, reported net income, NI_0, is not. Thus, the accounting and debt adjustments serve to convert the numerator in Equation 1 into a real measure of profitability.

One reason why reported earnings, NI_0, cannot be considered real is that U.S. companies use GAAP-approved historical-cost accounting conventions to determine their expenses. Although the historical-cost approach helps ensure objectivity, it results in an overstatement of real earnings during periods of rising prices. One area of concern is cost of goods sold when a significant lag exists between the purchase of inputs and the sale of finished goods. Another area of concern is when actual capital consumption differs from that captured by the depreciation method used for reporting purposes.

The accounting adjustments, α_0, reflect the modifications that must be made to GAAP-reported earnings to convert them from a historical-cost basis into a current-cost basis. The primary purpose of the current-cost accounting system is to reflect accurately the operating capabilities of a business, and it requires that assets be valued at their replacement cost. Thus, these adjustments would reduce reported earnings if replacement costs were increasing.

As first noted by Modigliani and Cohn (1979), the debt adjustment, ρD_0, reflects the impact of inflation on the real value of creditor claims. They argued that a substantial portion of a company's interest expense represents compensation to lenders because the value of the principal returned to them will be lower in real terms as a result of inflation. The GAAP-based earnings reported by leveraged companies will then understate real earnings because the GAAP-based earnings 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 devalued by inflation.

Our research extends the work of Wilcox (2007) in four ways. First, we provide a mathematical exposition (see Appendix A) as to why the adjusted earnings yield should be considered a reasonable approximation of real return. Second, we present methodologies that investors can use to estimate

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the accounting and debt adjustments for individual companies.[1] Third, by using a predictive regression model, we offer evidence that these adjustments are important considerations if the goal is to forecast real return accurately. Fourth, we review the use of nonfinancial corporate debt and make the case that investors should view the use of debt by nonfinancial companies in a more positive light.

Model Specifications and Estimation Methodology

Equation 1 may be rewritten as Equation 2, which indicates that real return is a function of three variables: (1) the earnings yield, NI_0/S_0; (2) the ratio of accounting adjustments to market capitalization, α_0/S_0; and (3) the ratio of the debt adjustment to market capitalization, $\rho D_0/S_0$.

$$R = \frac{NI_0}{S_0} + \frac{\alpha_0}{S_0} + \frac{\rho D_0}{S_0}. \tag{2}$$

Our regression models are based on Equation 2. We examined accounting adjustments in two areas: cost of goods sold and depreciation expense. In those cases, we put two accounting adjustments, α_0/S_0, into our regression models. Our predictive regression models are given in Equations 3 and 4:

$$\begin{aligned} R_{t-1\to t} &= \sum_{i=1}^{n} \delta_i + \beta_1 EY_{t-1} + \beta_2 COGSadj_{t-1} \\ &+ \beta_3 DEPadj_{t-1} + \beta_4 DEBTadj_{t-1} \\ &+ \varepsilon_{t-1\to t}, \end{aligned} \tag{3}$$

and

$$\begin{aligned} R_{t-1\to t} &= \sum_{i=1}^{n} \delta_i + \beta_1 EY_{t-1} + \beta_2 ACCTadj_{t-1} \\ &+ \beta_3 DEBTadj_{t-1} + \varepsilon_{t-1\to t}. \end{aligned} \tag{4}$$

The time subscripts $t-2$, $t-1$, and t indicate data from the beginning of the previous year, the beginning of the year, and the end of the year, respectively. The time subscript $t-1 \to t$ indicates a result or forecast for a one-year period (beginning of year to end of year). We obtained all accounting and return data from the Compustat database.

Real Return. We determined the nominal return, $r_{t-1\to t}$, by using Equation 5:

$$r_{t-1\to t} = \frac{PRICE_t}{PRICE_{t-1}} - 1. \tag{5}$$

$PRICE_t$ is computed as the stock price at the end of the fiscal year plus dividends received during the year divided by an adjustment factor. $PRICE_{t-1}$ is computed as the stock price at the beginning of the fiscal year divided by an adjustment factor. The adjustment factor adjusts the share price and dividend series for stock splits and other actions that would affect the share count for per share values.[2]

The real return, $R_{t-1\to t}$, is the nominal return, $r_{t-1\to t}$, adjusted for inflation. Following Wilcox (2007), we used a rate ($IPDinf_{t-1\to t}$) that is based on the GDP implicit price deflator.[3] The real return is determined from Equation 6:

$$R_{t-1\to t} = \frac{\left(1 + r_{t-1\to t}\right)}{\left(1 + IPDinf_{t-1\to t}\right)} - 1. \tag{6}$$

Intercept and Dummy Variables. We used eight different specifications for our regression models: four different specifications for each of the two regression models (Equations 3 and 4). Intercept and dummy variables are represented by $\sum_{i=1}^{n} \delta_i$ (where n is the number of these variables included in a regression). Every specification includes an intercept term. The specifications vary, depending on whether year and/or industry dummy variables are included in the analysis.

Earnings Yield. We defined the earnings yield, EY_{t-1}, as the net income (loss), NI_{t-1}, divided by the market capitalization, S_{t-1}, as noted in Equation 7:

$$EY_{t-1} = \frac{NI_{t-1}}{S_{t-1}}. \tag{7}$$

NI_{t-1} represents the income or loss reported by a company after expenses and losses have been subtracted from all revenues and gains for the fiscal year, including extraordinary items and discontinued operations.[4]

Cost of Goods Sold Adjustment. For our purposes, the physical change in inventories during any period should be valued at current-period prices. In practice, most companies use inventory valuation methods that rely on historical costs to some degree. Thus, if input prices change, the book value of inventories will frequently include a capital gain or loss even if there has been no change in the quantity of inventories.

For our research, the LIFO inventory method would be a popular valuation method that is closest to being theoretically correct because it uses recent prices to determine cost of goods sold. The LIFO method assumes that the last goods purchased are the first goods used (in a manufacturing concern) or the first goods sold (in a merchandising company). Of greater concern are those companies that use the FIFO inventory method, which assumes that the first goods purchased are the first goods used or sold.[5] Thus, the FIFO inventory method understates replacement cost in the presence of inflation.

We determined the annual rate of inflation for inventories on the basis of the U.S. Producer Price Index (PPI) for crude materials (PPI_t) and used it to adjust beginning inventory (INV_{t-2}) for inflation.[6] The degree of adjustment depends on the importance of the FIFO method to a company's inventory valuation. Our adjustment is similar to that used by studies that determine the replacement cost of inventory in order to estimate Tobin's q (see, e.g., Servaes 1991, citations).

The importance, or "weight," of FIFO, w_{t-1}, is determined as indicated in **Table 1**. Compustat provides codes for seven different inventory valuation methods, and up to four codes may appear as data for each company. Compustat lists the methods in order of relative amounts of inventory valued by each method. We assume the FIFO weight (w_{t-1}) to be zero if Compustat does not list FIFO as a reported inventory method.

Table 1. FIFO Weights

Reported No. of Inventory Methods	Rank of FIFO	Weight of FIFO (w_t)
1	1	1.0
1	NR	0
2	1	0.67
2	2	0.33
2	NR	0
3	1	0.50
3	2	0.33
3	3	0.17
3	NR	0
4	1	0.40
4	2	0.30
4	3	0.20
4	4	0.10
4	NR	0

NR = not reported.

Our cost of goods sold adjustment, $COGSadj_{t-1}$, is determined from Equation 8:

$$COGSadj_{t-1} = \frac{\left(PPI_{t-1}/PPI_{t-2} - 1\right)\left(INV_{t-2}\right)\left(w_{t-1}\right)}{S_{t-1}}, \quad (8)$$

where S_{t-1} is the market capitalization of the company's common shares.[7]

Depreciation-Expense Adjustment. The extent to which historical-cost depreciation falls short of current-cost depreciation depends on (1) capital investment (the change in the company's capital stock), (2) the longevity of assets, and (3) the rate of inflation. We used a methodology, first used by Shoven and Bulow (1975), that converts financial statement depreciation charges into an approximation of current-cost depreciation.

Capital investment (I_t) can be determined from Equation 9:

$$I_t = PPEnet_t - PPEnet_{t-1} + DEP_t, \quad (9)$$

where $PPEnet_t$ is property, plant, and equipment net of depreciation and DEP_t is depreciation expense.

Assuming straight-line depreciation, the average life of fixed assets, AL_t, can be determined from Equation 10:

$$AL_t = \frac{PPEgross_t}{DEP_t}, \quad (10)$$

where $PPEgross_t$ is the gross value of property, plant, and equipment.[8] AL_t is rounded to the nearest whole year.

The ratio of replacement-cost depreciation to historical-cost depreciation, RC_t/HC_t, can be determined from Equation 11:

$$\frac{RC_t}{HC_t} = \frac{NR_t \sum_{i=-AL_t}^{0} I_{t+i}}{\sum_{i=-AL_t}^{0} NR_{t+i} I_{t+i}}, \quad (11)$$

where NR_t is the GDP implicit price deflator for nonresidential fixed investment.[9]

The depreciation-expense adjustment, $DEPadj_{t-1}$, is then determined from Equation 12:

$$DEPadj_{t-1} = \frac{\left(RC_{t-1}/HC_{t-1} - 1\right) DEP_{t-1}}{S_{t-1}}, \quad (12)$$

where S_{t-1} is the market capitalization of the company's common shares.[10]

Accounting Adjustments. Accounting adjustments ($ACCTadj_{t-1}$) are the sum of the cost of goods sold adjustment and the depreciation-expense adjustment, as noted in Equation 13:

$$ACCTadj_{t-1} = COGSadj_{t-1} + DEPadj_{t-1}. \quad (13)$$

Debt Adjustment. Modigliani and Cohn (1979) were the first to note that fully expected inflation causes wealth transfers to shareholders because inflation erodes the real value of creditor claims. The portion of a company's interest expense that compensates creditors for the reduction in the real value of their claims actually represents the repayment of capital rather than an expense. Because companies are not taxed on that part of their return, the share of pretax operating income paid in taxes declines as the rate of inflation rises.

Our debt adjustment variable is determined from Equation 14:

$$DEBTadj_{t-1} = \frac{\rho_{t-1\to t} D_{t-1}}{S_{t-1}}. \quad (14)$$

Following Wilcox (2007), we obtained data for the expected rate of inflation, $\rho_{t-1\to t}$, from the Survey of Professional Forecasters (www.phil.frb.org/econ/spf/index.html), published by the Federal Reserve Bank of Philadelphia. The series reports the one-year-ahead inflation forecasts for the chain-weighted GDP price index and is the longest-running series of survey data for expected inflation.[11] Following French, Ruback, and Schwert (1983) and Ritter and Warr (2002), we used a company's net debt position as the theoretically correct measure of beginning-of-year debt (D_{t-1}). Net debt is computed as the sum of nominal liabilities less the sum of nominal assets. The nominal-assets adjustment is important because many companies have significant investments in such interest-earning assets as credit card receivables.[12] As before, S_{t-1} is the market capitalization of the company's common shares.[13]

Data and Summary Statistics

We constructed our sample from the annual Compustat database. We used annual data for our study because quarterly data from Compustat are not audited and are less comprehensive than annual data. After allowing for lag effects and survey data availability for the expected rate of inflation ($\rho_{t-1\to t}$) needed for the debt adjustment ($DEBTadj_t$), we chose a sample period of 1973–2006.

We did, however, use pre-1973 data to determine the ratio of replacement-cost depreciation to historical-cost depreciation, RC_t/HC_t, for the depreciation-expense adjustment, $DEPadj_t$. The determination of RC_t/HC_t depends on the estimate for the average life of fixed assets, AL_t. The Compustat data extend back to 1950. If, for example, in 1975 a company had an AL_t of 12 years, we would use data back to 1963 to determine RC_t/HC_t. If the company had an AL_t of 32 years, we would use data back to 1950 to determine RC_t/HC_t because data are unavailable for the years 1943–1949.

We followed the standard practice of excluding financial companies (four-digit SIC code: 6000–6999) and regulated utilities (four-digit SIC code: 4900–4999).[14] We required companies to have a CUSIP match in both Compustat and CRSP. We removed from the sample any companies with a missing book value of total assets and/or a missing book value of equity. We also removed company-year observations with missing or zero values for market capitalization, net income (loss), and depreciation and amortization.[15] Following Baker and Wurgler (2002), we deleted company-year observations with book values of total assets less than $10 million and market-to-book ratios greater than 10. The final dataset is an unbalanced panel set that comprises 93,734 company-year observations consisting of 10,447 companies with an average of 8.84 years (median = 6 years) of data per company. **Table 2** presents the company-year observations for each year in our sample.

Table 2. Company-Year Observations, 1973–2006

Year	Company-Year Observations	Year	Company-Year Observations
1973	1,449	1991	2,570
1974	1,862	1992	2,638
1975	2,238	1993	2,782
1976	2,289	1994	3,035
1977	2,240	1995	3,314
1978	2,183	1996	3,568
1979	2,109	1997	3,726
1980	2,122	1998	3,959
1981	2,150	1999	3,864
1982	2,132	2000	3,668
1983	2,233	2001	3,483
1984	2,204	2002	3,710
1985	2,258	2003	3,657
1986	2,327	2004	3,565
1987	2,347	2005	3,441
1988	2,406	2006	3,164
1989	2,507	Total	93,734
1990	2,534		

Table 3 presents the summary statistics for our sample. The mean (annual) real return ($R_{t-1\to t}$) is 14.9 percent, with a median (annual) real return of 3.5 percent. The mean and median earnings yields (EY_{t-1}) are –1.7 percent and 5.4 percent, respectively. The means for the accounting adjustments ($ACCTadj_{t-1}$; 2.4 percent) and debt adjustment ($DEBTadj_{t-1}$; 2.8 percent) suggest that these adjustments could significantly alter the forecast for a company's real expected return.

Ex ante, our work predicts that the earnings yield, EY_{t-1}, and the debt adjustment, $DEBTadj_{t-1}$, will be positively correlated with the real return, $R_{t-1\to t}$. It also predicts that the accounting adjustments ($COGSadj_{t-1}$, $DEPadj_{t-1}$, and $ACCTadj_{t-1}$) will be negatively correlated with $R_{t-1\to t}$.

The correlations reported in **Table 4** are consistent with our expectations. All the correlations are of the expected sign, and all are statistically

Table 3. Summary Statistics, 1973–2006
(93,734 company-year observations)

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
$R_{t-1\rightarrow t}$ (real return)	0.14860	0.03503	0.87242	–0.99716	112.92447
EY_{t-1} (earnings yield)	–0.01653	0.05413	1.51487	–123.37598	349.53794
$COGSadj_{t-1}$ (COGS adjustment)	0.01371	0	0.08771	–7.09462	4.67795
$DEPadj_{t-1}$ (depreciation-expense adjustment)	0.01006	0.00072	0.06269	–7.27546	7.72159
$ACCTadj_{t-1}$ (accounting adjustments)	0.02378	0.00267	0.11124	–8.56099	7.67533
$DEBTadj_{t-1}$ (debt adjustment)	0.02801	0.00525	0.16477	–0.42194	22.98515

Table 4. Correlation Matrix, 1973–2006
(93,734 company-year observations)

	$R_{t-1\rightarrow t}$	EY_{t-1}	$COGSadj_{t-1}$	$DEPadj_{t-1}$	$ACCTadj_{t-1}$	$DEBTadj_{t-1}$
$R_{t-1\rightarrow t}$ (real return)	1.00000					
EY_{t-1} (earnings yield)	0.25335	1.00000				
	(<0.0001)					
$COGSadj_{t-1}$ (COGS adjustment)	–0.06684	0.01154	1.00000			
	(<0.0001)	(0.0004)				
$DEPadj_{t-1}$ (depreciation-expense adjustment)	–0.06113	–0.13423	0.06819	1.00000		
	(<0.0001)	(<0.0001)	(<0.0001)			
$ACCTadj_{t-1}$ (accounting adjustments)	–0.08716	–0.06654	0.82696	0.61735	1.00000	
	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)		
$DEBTadj_{t-1}$ (debt adjustment)	0.29315	0.15425	0.01927	0.14791	0.09855	1.00000
	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	

Note: Significance levels are in parentheses.

significant at the 0.0001 level or better. The debt adjustment, $DEBTadj_{t-1}$, has the strongest correlation with the real return, $R_{t-1\rightarrow t}$, with a correlation coefficient of 0.29, followed by the earnings yield, EY_{t-1}, with a correlation coefficient of 0.25. The correlation coefficients of the accounting adjustments ($COGSadj_{t-1}$, $DEPadj_{t-1}$, and $ACCTadj_{t-1}$) are –0.07, –0.06, and –0.09, respectively.

Regression Results

Table 5 reports the regression results for our predictive regression models (Equations 3 and 4). The traditional ordinary least-squares (OLS) *t*-test statistics for these models are unreliable because of concerns about the likely existence of heteroscedasticity and serial correlation. We addressed these concerns by using the Newey–West (1987) correction, which produces a general heteroscedastic and autoregressive consistent covariance matrix for OLS regression analysis. In Table 5, we refer to results that use this correction as Newey–West regression results.

The use of seasonal dummies is widespread in the finance literature because of various calendar effects on share prices. To control for effects peculiar to a particular year, we assigned a 1–0 dummy variable to each year's observations. Following the classification system used by Fama and French (1997), we used a 1–0 dummy variable to control for industry effects by assigning companies to a specific industry on the basis of their four-digit SIC codes.

For specifications with one fixed effect (i.e., either the year or the industry dummy was included in the analysis, but not both), we dropped one of the dummy variables and included an intercept. For specifications with two fixed effects (i.e., both the year and the industry dummies were included in the analysis), we dropped one dummy variable for each of the two fixed effects and included an intercept.

Our regression results are consistent with our predictions. In Table 5, Newey–West regression 1 and regression 2 do not include year and industry dummy variables. All the coefficient estimates are of the predicted sign. The coefficient estimates for the earnings yield, EY_{t-1}, are not quite statistically significant at the 10 percent level. The coefficient estimates for the accounting adjustments ($COGSadj_{t-1}$, $DEPadj_{t-1}$, and $ACCTadj_{t-1}$) and the debt adjustment ($DEBTadj_{t-1}$) are statistically significant at the 10 percent level or better.

Newey–West regression 3 and regression 4 include year but not industry dummy variables.

Table 5. Newey–West Regression Results, 1973–2006
(93,734 company-year observations; dependent variable is $R_{t-1 \to t}$ [real return])

Explanatory Variables	β_i Estimate			
	Regression 1	Regression 2	Regression 3	Regression 4
Intercept	0.129	0.129	0.105	0.103
	(13.01***)	(13.02***)	(2.79***)	(2.74***)
EY_{t-1} (earnings yield)	0.117	0.118	0.117	0.118
	(1.61)	(1.60)	(1.62)	(1.61)
$COGSadj_{t-1}$ (COGS adjustment)	–0.693		–0.676	
	(–1.81*)		(–1.74*)	
$DEPadj_{t-1}$ (depreciation-expense adjustment)	–0.969		–0.929	
	(–2.07**)		(–2.01**)	
$ACCTadj_{t-1}$ (accounting adjustments)		–0.786		–0.762
		(–2.13**)		(–2.05**)
$DEBTadj_{t-1}$ (debt adjustment)	1.448	1.437	1.470	1.460
	(2.75***)	(2.74***)	(2.76***)	(2.75***)
Year dummy variables	No	No	Yes	Yes
Industry dummy variables	No	No	No	No
Adjusted R^2	14.04%	14.02%	14.27%	14.25%
	Regression 5	Regression 6	Regression 7	Regression 8
Intercept	0.007	0.002	–0.020	–0.028
	(0.41)	(0.14)	(–0.51)	(–0.74)
EY_{t-1} (earnings yield)	0.119	0.120	0.119	0.120
	(1.63)	(1.63)	(1.64)	(1.63)
$COGSadj_{t-1}$ (COGS adjustment)	–0.537		–0.535	
	(–1.21)		(–1.20)	
$DEPadj_{t-1}$ (depreciation-expense adjustment)	–0.965		–0.948	
	(–2.02**)		(–2.00**)	
$ACCTadj_{t-1}$ (accounting adjustments)		–0.689		–0.682
		(–1.68*)		(–1.66*)
$DEBTadj_{t-1}$ (debt adjustment)	1.433	1.417	1.450	1.435
	(2.68***)	(2.65***)	(2.69***)	(2.66***)
Year dummy variables	No	No	Yes	Yes
Industry dummy variables	Yes	Yes	Yes	Yes
Adjusted R^2	18.07%	18.01%	18.23%	18.18%

Notes: The two models tested are $R_{t-1 \to t} = \sum_{i=1}^{n} \delta_i + \beta_1 EY_{t-1} + \beta_2 COGSadj_{t-1} + \beta_3 DEPadj_{t-1} + \beta_4 DEBTadj_{t-1} + \varepsilon_{t-1 \to t}$ and $R_{t-1 \to t} = \sum_{i=1}^{n} \delta_i + \beta_1 EY_{t-1} + \beta_2 ACCTadj_{t-1} + \beta_3 DEBTadj_{t-1} + \varepsilon_{t-1 \to t}$, where $ACCTadj_{t-1} = COGSadj_{t-1} + DEPadj_{t-1}$. Every specification includes an intercept term. The specifications vary depending on whether year and/or industry dummy variables are included in the analysis. The Newey–West t-statistics are in parentheses.

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

Newey–West regression 5 and regression 6 include industry but not year dummy variables. All the coefficient estimates are of the predicted sign. Consistent with the results for regressions 1 and 2, the coefficient estimates for the earnings yield, EY_{t-1}, are not quite statistically significant at the 10 percent level.

Although the coefficient estimate for the cost of goods sold adjustment, $COGSadj_{t-1}$, is negative and statistically significant at the 10 percent level in regression 3, it is not statistically significant at the 10 percent level in regression 5. The depreciation-expense adjustment ($DEPadj_{t-1}$), however, is statistically significant at the 5 percent level in regressions 3 and 5. Total accounting adjustments ($ACCTadj_{t-1}$) are significant at the 5 percent level in regression 4 and at the 10 percent level in regression 6. The debt adjustment, $DEBTadj_{t-1}$, is statistically significant at the 1 percent level in regressions 3–6.

Newey–West regression 7 and regression 8 include both year and industry dummy variables. All the coefficient estimates are of the predicted sign. Consistent with previous results, the coefficient estimates for the earnings yield, EY_{t-1}, are not quite statistically significant at the 10 percent level.

The coefficient estimate for the cost of goods sold adjustment, $COGSadj_{t-1}$, is not statistically significant at the 10 percent level in regression 7. The depreciation-expense adjustment ($DEPadj_{t-1}$), however, is statistically significant at the 5 percent level in regression 7. Total accounting adjustments ($ACCTadj_{t-1}$) are significant at the 10 percent level in regression 8. The debt adjustment, $DEBTadj_{t-1}$, is statistically significant at the 1 percent level in regressions 7 and 8.

We believe that the Newey–West regression results in Table 5 provide evidence that should be of interest to most investors. First, the coefficient estimates for the earnings yield variable, EY_{t-1}, are never quite statistically significant in all our Newey–West regressions. This finding alone allows one to question the usefulness of reported earnings as a valuation input for determining real return. Could security analysis be improved if more investment professionals simply recognized the limitations of reported earnings? In a survey of analysts, Block (1999) noted that earnings are preferred over cash flow, dividends, and book value as a valuation input.

Nevertheless, as noted in Table 5, the coefficient estimates for the accounting and debt adjustments are statistically significant. For the accounting adjustments, the evidence for the importance of the depreciation-expense adjustment, $DEPadj_{t-1}$, is the strongest because the coefficient estimate is statistically significant at the 5 percent level in all the regressions in which that adjustment is used. One could argue that the cost of goods sold adjustment, $COGSadj_{t-1}$, is important when evaluating companies with large investments in inventories. Although the coefficient estimate for that adjustment is not always statistically significant, it is statistically significant at the 10 percent level in regressions 1 and 3. Finally, the evidence for the importance of the debt adjustment, $DEBTadj_{t-1}$, is very robust because the coefficient estimate for that variable is statistically significant at the 1 percent level in all our regressions.

Nonfinancial Corporate Debt Usage

We believe that one of the more interesting results of our research is that it demonstrates, both mathematically (see Appendix A) and empirically, that a company's financing decisions can affect real equity returns. We suspect that investors should view debt usage by nonfinancial companies more positively than they currently do.[16] We also suspect that many nonfinancial companies that sincerely pursue the goal of shareholder wealth maximization should consider adding more debt to their capital structure. This consideration obviously needs to be tempered by the financial risk that would be added by new borrowings. But we believe that many nonfinancial companies are currently underlevered.

Numerous benefits of debt financing have long been identified in the literature. Some of the seminal efforts include Modigliani and Miller (1963), who were the first to formally note the tax advantages of debt. Ross (1977) and Leland and Pyle (1977) argued that the decision to issue debt could be thought of as a signal of company quality. Jensen and Meckling (1976) showed that debt helps overcome the agency costs of outside equity. Jensen (1986) pointed out the advantages of debt in restricting managerial discretion. Raviv and Harris (1991) established that debt is a disciplining device because default gives creditors the option to force companies into liquidation.

Our results are consistent with those of Bhandari (1988), who found that stock returns for a sample of financial and nonfinancial companies are positively related to the debt-to-equity ratio even after controlling for beta and size. More recently, Green and Jegadeesh (2006) showed that companies that are overlevered relative to their target leverage ratio outperform underlevered companies by roughly 5 percent a year over the next three to five years. Barbee, Mukherji, and Raines (1996) found that returns increase with leverage.

Perhaps paradoxically, debt usage by nonfinancial companies has declined. For our sample companies, **Figure 1** shows that the yearly median values of the debt-to-market-capitalization ratios have declined to or near their lowest level over the period of our study. This finding is true whether debt is measured as total debt, long-term debt, or net debt.[17] **Figure 2**, however, shows that times interest earned increased significantly toward the end of our study and finished close to its all-time high.

Figure 1. Median Values of Debt as a Percentage of Market Capitalization for Sample Companies, 1973–2006

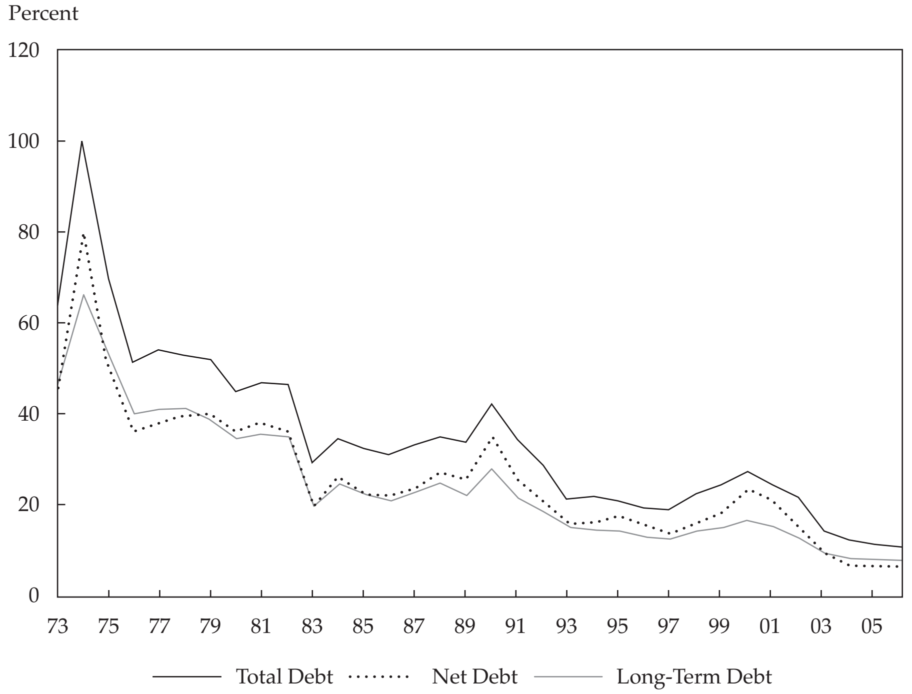

Figure 2. Median Values of Times Interest Earned (TIE) for Sample Companies, 1973–2006

Note: Observations with interest expense equal to zero are not included in the sample.

What was the relationship between capital structure and real returns for the companies in our study? To answer this question, we sorted the company-year observations for each year into quintiles on the basis of various measures of debt-to-market capitalization at the beginning of the fiscal year. For each quintile, real returns are for the fiscal year following the sort and are averaged over the period of our study. **Table 6** shows that average real returns are highest for the quintile with the highest debt-to-market capitalization, regardless of whether debt is measured as total debt, long-term debt, or net debt.[18]

How did increasing the debt-to-market-capitalization ratio affect real returns for the companies in our study? To answer this question, we partitioned the company-year observations for each year into quintiles on the basis of increases in various measures of debt-to-market-capitalization over the previous fiscal year. Real returns are for the fiscal year following the sort and are averaged over the period of our study for each quintile. **Table 7** shows that average real returns are positive for all quintiles. Table 7 also shows that average real returns are highest for companies with the greatest increase in debt-to-market-capitalization, regardless of whether debt is measured as total debt, long-term debt, or net debt.

A great deal of research has been and will continue to be directed at companies' financing decisions. The search for a value-maximizing capital structure continues to be a priority for many nonfinancial companies, and we would be the last to claim that we know what is best for each of the 10,447 companies in our sample. We do believe, however, that our results indicate that nonfinancial corporate debt usage needs to be considered in a more favorable light, both by investors and by many of the companies in our sample.

Table 6. Real Returns for Portfolio Quintiles Sorted on Various Measures of the Debt-to-Market-Capitalization Ratio, 1973–2006

Quintile	Sort Variable: Total Debt/Market Capitalization	Sort Variable: Long-Term Debt/Market Capitalization	Sort Variable: Net Debt/Market Capitalization
1 (sample companies with the lowest proportion of debt financing)	13.1%	14.1%	19.9%
2	13.0	12.2	8.4
3	11.6	11.1	10.5
4	14.2	14.3	13.4
5 (sample companies with the highest proportion of debt financing)	22.4	21.5	22.2

Notes: Portfolios are sorted into quintiles at the beginning of each fiscal year on the basis of the debt-to-market-capitalization measure noted at the top of each column. Real returns are for the fiscal year following the sort. Data are drawn from the 93,734 company-year observations that were used to produce our regression results.

Table 7. Real Returns for Portfolio Quintiles Sorted on Increases in Various Measures of the Debt-to-Market-Capitalization Ratio, 1973–2006

Quintile	Sort Variable: Increase in Total Debt/Market Capitalization	Sort Variable: Increase in Long-Term Debt/Market Capitalization	Sort Variable: Increase in Net Debt/Market Capitalization
1 (sample companies with the smallest increase in the proportion of debt financing)	11.6%	11.8%	9.6%
2	13.0	13.1	9.3
3	12.0	11.4	9.9
4	12.1	13.3	11.0
5 (sample companies with the largest increase in the proportion of debt financing)	24.1	24.1	24.2

Notes: Portfolios are sorted into quintiles at the beginning of each fiscal year on the basis of increases in the debt-to-market-capitalization measure noted at the top of each column. Real returns are for the fiscal year following the sort. Data are drawn from the 93,734 company-year observations that were used to produce our regression results: 43,581 company-year observations for companies that increased their total debt-to-market-capitalization ratio, 40,881 company-year observations for companies that increased their long-term debt-to-market-capitalization ratio, and 48,007 company-year observations for companies that increased their net debt-to-market-capitalization ratio.

The United States and many other countries are currently facing a credit crisis. Although the reasons for this crisis are varied and complex, many researchers point to credit and liquidity problems in the global banking system caused by the bursting of the residential housing bubble. We believe that our timely article provides evidence that the brunt of the crisis should fall on households and financial institutions. Certainly, the crisis has spread to nonfinancial companies and will likely continue to do so. But little reason exists to suspect that nonfinancial companies, as a group, were overlevered or struggling to meet their debt obligations before the crisis.

Conclusion

The adjusted-earnings-yield formula predicts that real return is a function of both the earnings yield and the accounting and debt adjustments necessary to convert the earnings yield into a real measure. The adjusted-earnings-yield measure created for the U.S. equity market in Wilcox (2007) was shown to be a much better predictor of real equity returns than were other popular market valuation ratios.

Our research presented in this article extends the work of Wilcox (2007) to the valuation of individual companies. For the accounting adjustments, we identified the use of the FIFO inventory valuation method as a GAAP-approved accounting choice that would cause reported earnings to be greater than real earnings in a period of rising prices. We also found that inflation results in reported earnings being greater than real earnings because of the GAAP requirement that depreciation expense be based on acquisition cost. Our adjustments serve to convert reported cost of goods sold and depreciation expense into a current-cost accounting system. Our accounting adjustments are based on measures used by earlier researchers (see, e.g., Servaes 1991; Shoven and Bulow 1975).

For the debt adjustment, we used the adjustment first identified in Modigliani and Cohn (1979). Following French, Ruback, and Schwert (1983) and Ritter and Warr (2002), we used a company's net debt position as the theoretically correct measure of debt. Debt usage during a period of rising prices results in reported earnings being less than real earnings: Debt issuance is not taxed, but the inflation compensation paid to creditors is a tax-deductible expense.

We used predictive regression models to test the importance of the accounting and debt adjustments as predictors of real returns. Our results show that the coefficient estimates for the adjustments are statistically significant over the period of our study. Thus, the recommended adjustments to GAAP-based reported earnings should be considered important by investors. Our results are particularly robust for the debt adjustment because the coefficient estimate for that variable is statistically significant at the 1 percent level in all our regressions.

We also show that debt usage by nonfinancial companies declined to or near its lowest level over the period of our study, regardless of whether debt is measured as total debt, long-term debt, or net debt. Times interest earned, however, increased significantly toward the end of our study and finished close to its all-time high. These results seem to be at odds with the predictions of the adjusted-earnings-yield formula, which suggests that debt usage may contribute positively to real return.

Over the period of our study, average real returns were highest for the quintile of companies with the highest debt-to-market-capitalization ratio. For those companies that increased their debt-to-market-capitalization ratio, we found that the quintile of companies with the greatest increase had the highest average real returns over the period of our study. We believe that our results show that debt usage should be viewed in a more favorable light by both investors and nonfinancial companies.

This article qualifies for 1 CE credit.

Appendix A. Adjusted Earnings Yield as an Estimate of Real Return

This appendix presents an adjusted-earnings-based approach to estimating the real expected return for equity. First, consider the case of U, a no-growth, unlevered company. (Subscripts indicate the period in which a cash flow or valuation occurs.) Assume that Company U initially has a market value (V_0) and operates in an inflation-free society. The tax rate, T, is assumed to be the same percentage for all levels of taxable income.

If all earnings are paid out as dividends, the market value of Company U, V_0, is a function of the company's reported net income, NI_0, discounted at the assumed constant real expected return, R_U, as determined in Equation A1:

$$\begin{aligned} V_0 &= \frac{NI_0}{R_U} \\ &= \frac{EBT_0\left(1-T\right)}{R_U}. \end{aligned} \tag{A1}$$

Note that net income (NI_0) is equivalent to earnings before taxes (EBT_0), adjusted for taxes by using the tax rate, T. Real expected return (R_U) can be determined as an earnings yield by using Equation A2:

$$\begin{aligned} R_U &= \frac{NI_0}{V_0} \\ &= \frac{EBT_0(1-T)}{V_0}. \end{aligned} \tag{A2}$$

Next, assume the existence of a fully expected and perpetual inflation rate (ρ). The nominal expected return, r_U, can be determined from Equation A3:

$$r_U = (1+R_U)(1+\rho)-1. \tag{A3}$$

The company's market value at any future period n can be determined from Equation A4:

$$V_n = \sum_{t=n+1}^{\infty} \frac{EBT_n(1-T)(1+\rho)^{t-n}}{(1+r_U)^{t-n}}. \tag{A4}$$

Equation A4 reduces to Equation A5:

$$\begin{aligned} V_n &= \frac{NI_n}{k} \\ &= \frac{EBT_n(1-T)}{k}, \end{aligned} \tag{A5}$$

in which $k \neq R_U$ and cannot be considered real if reported earnings before tax (EBT_n) is determined by using historical-cost accounting conventions for goods and services acquired in periods prior to n. Depreciation expense is one example of such a U.S. GAAP convention because depreciation expense is based on the asset's acquisition cost. Another example is cost of goods sold if a company chooses the U.S. GAAP–approved FIFO inventory valuation method.

If historical-cost accounting conventions are used, then accounting adjustments (a_n) must be made to convert operating income into a current- or replacement-cost basis (Equation A6) and real expected return (R_U) can be determined as an adjusted earnings yield by using Equation A7:

$$\begin{aligned} V_n &= \frac{NI_n + \alpha_n}{R_U} \\ &= \frac{EBT_n(1-T)+\alpha_n}{R_U}, \end{aligned} \tag{A6}$$

and

$$\begin{aligned} R_U &= \frac{NI_0 + \alpha_0}{V_0} \\ &= \frac{EBT_0(1-T)+\alpha_0}{V_0}. \end{aligned} \tag{A7}$$

The literature abounds with examples of accounting adjustments (a_0), as in Equation A7, to facilitate an accurate forecast of either real equity returns or real equity cash flows. Two recent examples are Ritter and Warr (2002) and Wilcox (2007). Ritter and Warr used a company-level depreciation adjustment that grosses up depreciation expense on the basis of the amount of inflation over the life of the assets. Wilcox used the inventory valuation adjustment of the Bureau of Economic Analysis to reflect the market-level difference between book and current-cost inventory withdrawals. Wilcox also used the bureau's capital consumption adjustment to reflect the market-level difference between book and economic depreciation.

Now, consider the case of L, a no-growth, levered company operating in zero inflation. Assuming that all earnings are paid out as dividends, the market value of Company L's equity, S_0, is determined from Equation A8:

$$\begin{aligned} S_0 &= \frac{NI_0}{R_L} \\ &= \frac{(EBIT_0 - R_D D_0)(1-T)}{R_L}. \end{aligned} \tag{A8}$$

Here, net income (NI_0) is equivalent to earnings before interest and taxes ($EBIT_0$), adjusted for taxes by using the tax rate, T, which is assumed to be a fixed percentage for all levels of taxable income. The real cost of debt, R_D, is assumed to be constant. The current value of debt is D_0. The assumed constant real expected return for levered equity, R_L, can be determined as an earnings yield by using Equation A9:

$$\begin{aligned} R_L &= \frac{NI_0}{S_0} \\ &= \frac{(EBIT_0 - R_D D_0)(1-T)}{S_0}. \end{aligned} \tag{A9}$$

If a fully expected and perpetual inflation rate (ρ) exists, the nominal cost for levered equity, r_L, can be determined from Equation A10:

$$r_L = (1+R_L)(1+\rho)-1. \tag{A10}$$

For simplicity of exposition and following Modigliani and Cohn (1979), we ignore the Fisher (1930) effect and assume that the nominal cost of debt, r_D, is equal to the real cost of debt, R_D, plus the rate of inflation, ρ, as noted in Equation A11:

$$r_D = R_D + \rho. \tag{A11}$$

Equation A11 indicates that inflation negatively affects Company *L*'s net income through an increase in interest expense. The change in net income attributable to inflation's impact on interest expense (ΔNI_0) is determined from Equation A12:

$$\Delta NI_0 = -\rho D_0 \left(1 - T\right). \quad \text{(A12)}$$

As noted by Ritter and Warr (2002), however, asset values also increase at the rate of inflation, ρ. Assuming a constant ratio of debt to assets and the issuance of new debt at the beginning of each year, Company *L* issues new debt in the amount of ρD_0. This action creates a net cash inflow for shareholders because interest on debt is a tax-deductible expense whereas the cash flow from issuing new debt is untaxed. Equation A13 indicates how the net cash flow to shareholders, NCF_0, is determined; it shows that inflation benefits the shareholders of levered companies:

$$\begin{aligned} NCF_0 &= \rho D_0 - \Delta NI_0 \\ &= \rho D_0 T. \end{aligned} \quad \text{(A13)}$$

The debt adjustment, ρD_0, first appeared in the literature in 1979 (Modigliani and Cohn). Ritter and Warr (2002) noted that any valuation approach that relies on GAAP-based reported earnings (NI_0) will be biased downward for levered companies in the presence of inflation unless explicit corrections (i.e., ρD_0) are made. Importantly, this misevaluation occurs even if investors have perfect foresight about future inflation.

Equation A14 can be used to determine the market value of equity for Company *L* at any future period *n*:

$$\begin{aligned} S_n &= \sum_{t=n+1}^{\infty} \frac{\left(NI_n + \rho D_n\right)\left(1+\rho\right)^{t-n}}{\left(1 + r_L\right)^{t-n}} \\ &= \sum_{t=n+1}^{\infty} \frac{\left[\left(EBIT_n - r_D D_n\right)\left(1 - T\right) + \rho D_n\right]\left(1+\rho\right)^{t-n}}{\left(1 + r_L\right)^{t-n}}. \end{aligned} \quad \text{(A14)}$$

As in the discussion for Company *U*, Equation A14 reduces to Equation A15:

$$\begin{aligned} S_n &= \frac{NI_n + \rho D_n}{k} \\ &= \frac{\left(EBIT_n - r_D D_n\right)\left(1 - T\right) + \rho D_n}{k}, \end{aligned} \quad \text{(A15)}$$

in which $k \neq R_L$ and cannot be considered real if earnings before interest and taxes ($EBIT_n$) is determined by using historical-cost accounting conventions for goods and services acquired in periods prior to *n*.

If historical-cost accounting conventions are used, then accounting adjustments (a_n) must be made to convert earnings before interest and taxes ($EBIT_n$) into a current- or replacement-cost basis (Equation A16) and real expected return (R_L) can be determined as an adjusted earnings yield by using Equation A17:

$$\begin{aligned} S_n &= \frac{NI_n + \alpha_n + \rho D_n}{R_L} \\ &= \frac{\left(EBIT_n - r_D D_n\right)\left(1 - T\right) + \alpha_n + \rho D_n}{R_L}, \end{aligned} \quad \text{(A16)}$$

and

$$\begin{aligned} R_L &= \frac{NI_0 + \alpha_0 + \rho D_0}{S_0} \\ &= \frac{\left(EBIT_0 - r_D D_0\right)\left(1 - T\right) + \alpha_0 + \rho D_0}{S_0}. \end{aligned} \quad \text{(A17)}$$

Notes

1. The adjustments presented in this article should be considered approximations. Empirical work with large databases, such as Standard & Poor's Compustat, frequently requires the adoption of "one size fits all" variables that are never precisely accurate for every observation in the dataset. At the very least, however, our results should raise concerns about the veracity of reported earnings as a measure of a company's true profitability. We encourage equity analysts who seek to incorporate our research into their own work to consider alternative adjustments that are customized to better fit the companies they follow.
2. The Compustat data items used for $PRICE_t$ and $PRICE_{t-1}$ are price-fiscal year-close (199), dividends per share by ex-date (26), and adjustment factor (cumulative) by ex-date (27).
3. We also deflated nominal returns by using the U.S. Consumer Price Index and the implicit price deflator–personal consumption expenditures without materially affecting our results (available from the authors upon request). Data for the GDP implicit price deflator are available from the U.S. Department of Commerce Bureau of Economic Analysis (http://bea.gov).
4. The Compustat data item used for NI_{t-1} is net income (loss) (172). The Compustat data items used to determine market capitalization (S_{t-1}) are price-fiscal year-close (199) and common shares outstanding (25).
5. AICPA (2007) reports the results of a 2006 survey of 802 companies regarding their choice of inventory valuation method; 385 companies (48.0 percent) reported that they used FIFO, and 228 companies (28.4 percent) reported that they used LIFO. Of the 228 companies that used LIFO, only 11 relied on that method for all inventories. Of the 93,734 observations in our sample, 41,764 had a FIFO rank of 1 (44.6 percent) and 11,419 had a FIFO rank of 2 (12.2 percent).

6. PPI data for crude materials are available from the U.S. Bureau of Labor Statistics (www.bls.gov).
7. The Compustat data items used to determine the numerator of Equation 8 are inventories-total (3) and inventory valuation method (59). The Compustat data items used to determine market capitalization (S_{t-1}) are price-fiscal year-close (199) and common shares outstanding (25).
8. Most companies use straight-line depreciation for financial reporting purposes. AICPA (2007) reports the results of a 2006 survey in which 596 of 667 companies (89.4 percent) reported that they used straight-line depreciation to determine accounting income.
9. Data for the GDP implicit price deflator for nonresidential fixed investment are available from the Bureau of Economic Analysis (http://bea.gov).
10. The Compustat data items used to determine the numerator of Equation 12 are property, plant, and equipment–total (net) (8); depreciation and amortization (14); and property, plant, and equipment–total (gross) (7). The Compustat data items used to determine market capitalization (S_{t-1}) are price-fiscal year-close (199) and common shares outstanding (25).
11. The Bureau of Economic Analysis switched from a fixed-base-year method to simplified chain weighting in 1995, primarily because of a dramatic fall in computer prices. The bureau calculates growth for a year and for the preceding year. The chain-weighted growth for a year is an average of the growth for the two years.
12. We also used long-term debt–total (9) and total debt as the sum of debt in current liabilities (34) and long-term debt–total (9) as D_{t-1} variables in our predictive regressions without materially affecting the results (available from the authors upon request).
13. The Compustat data items are nominal debt as the sum of debt in current liabilities (34), accounts payable (70), income taxes payable (71), current liabilities–other (72), long-term debt–total (9), liabilities-other (75), deferred taxes (35), minority interest (38), and preferred stock (130) minus nominal assets as the sum of cash and short-term investments (1), receivables-total (2), current assets–other (68), and investments and advances–other (32). The Compustat data items used to determine market capitalization (S_{t-1}) are price-fiscal year-close (199) and common shares outstanding (25).
14. A recent study that excluded data for financial institutions and utilities is Flannery and Rangan (2006).
15. We removed these company-year observations because market capitalization, net income (loss), and depreciation and amortization are important determinants of the adjusted earnings yield.
16. We were unable to find survey data regarding investors' opinions about nonfinancial corporate debt usage. In *The Intelligent Investor*, however, Benjamin Graham (1973) suggests that defensive investors limit themselves to industrial companies in which long-term debt does not exceed net current assets (working capital). A survey of stock screens on the website of the American Association of Individual Investors (www.aaii.com) reveals that many screens use some maximum debt ratio as a screening criterion. Some of the screens and their criteria are linked to famous investors, such as Warren Buffett and Peter Lynch. Thus, we suspect that many investors favor nonfinancial companies with low levels of debt.
17. The yearly median values of the debt-to-book-value-of-equity ratios of our sample companies have also declined to or near their lowest level over the period of our study (these results are available from the authors upon request).
18. Note that the results in Table 6 are not linear and that the first quintile (companies with the lowest proportion of debt funding) performed reasonably well. Remember, however, that we created the portfolio quintiles on the basis of a sort tied to some measure of the debt-to-market-capitalization ratio. We used no controls for other important determinants of real return, such as profitability. One plausible explanation for the Table 6 results is that they reflect the pecking order theory of Myers (1984). That theory predicts an inverse relationship between profitability and debt ratios because companies first rely on internal funding. Profitability differences may contribute to the results in Table 6. Our regression models control for profitability differences arising from the inclusion of the earnings yield as an explanatory variable.

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