THE ADJUSTED EARNINGS YIELD: EUROPEAN EVIDENCE

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Abstract

The adjusted earnings yield formula presented in Wilcox (2007) showed that an accurate forecast of real return requires that accounting and debt adjustments be made to reported earnings. Palkar and Wilcox (2009) presented methodologies that investors can use to estimate the accounting and debt adjustments for individual companies. Using a predictive regressions model and the Compustat® North American database they present evidence that these adjustments should be considered important by investors.

In this paper, we extend the work of Palkar and Wilcox (2009) and make use of the Compustat® Global database to test the importance of the accounting and debt adjustments as predictors of real returns for European companies. Our results do show that the coefficient estimates for the adjustments are statistically significant over the time period of the study. Thus, the recommended adjustments to reported earnings should be considered important by analysts following these companies.

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I. Introduction

Wilcox (2007) showed that an adjusted earnings yield provides a reasonable estimate of real expected return. Adjustments are made to reported earnings to (1) convert them to a current-cost (replacement-cost) accounting system and (2) reflect the benefit that accrues to shareholders from repaying debt with a currency that has been cheapened by inflation. 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 other popular market valuation ratios.

Palkar and Wilcox (2009) present methodologies that investors can use to estimate the accounting and debt adjustments for individual companies. The authors use a predictive regression model and the Compustat® North American database to show that that the adjustments should be considered important by investors. Their results were particularly robust for the debt adjustment as the coefficient estimate for that variable was statistically significant at the 1 percent significance level in all of regressions.

In this paper, we extend the work of Palkar and Wilcox (2009) to the analysis of European companies. We use predictive regression models to test the importance of the accounting and debt adjustments as predictors of real returns. Our results do show that the coefficient estimates for the adjustments are statistically significant over the time period of the study. Thus, the recommended adjustments to reported earnings should be considered important by investors.

II. The Adjusted Earnings Yield

The Appendix provides a mathematical exposition as to why the adjusted earnings yield should be considered a reasonable approximation of real return. The formula for the adjusted earnings yield is presented in equation (1) and subscripts are used to indicate the time period a cash flow or valuation occurs. The real expected return is R. NI_0 is reported net income, α_0 is the accounting adjustments, and ρD_0 is the debt adjustment where ρ is the expected rate of inflation and D_0 is debt. S_0 is the market value of the company's equity.

$$R = \frac{NI_0 + \alpha_0 + \rho D_0}{S_0} \tag{1}$$

It is important to recognize that the adjusted earnings yield provides an approximation for real, not nominal return. For R to be considered real in equation (1), it must be determined as a ratio of current period 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 the purpose of converting the numerator of equation (1) to a real measure of profitability.

One reason reported earnings, NI_0, cannot be considered real is because European firms frequently make use of historical cost accounting conventions. One area of concern would be cost of goods sold when there is a significant lag between the purchase of inputs and the sale of finished goods. Another would occur if actual capital consumption differs from that captured by the depreciation method used for reporting purposes.

An example will show the importance of an accounting adjustment, α_0, for cost of goods sold. Assume that Company Θ is a British manufacturing firm that reports cost of goods sold of £15 million. In computing reported earnings, Company Θ chooses the first-in, first-out (FIFO) method to value inventory. The FIFO method assumes that the first goods purchased are the first used in the manufacturing process and is a permissible accounting choice under International Accounting Standard (IAS) 2. While the FIFO method has several advantages, it fails to match current costs against current revenues on the income statement in the presence of inflation.[1]

Company Θ's reported earnings cannot be considered a real measure of profitability. This is because cost of goods sold fails to capture the cost of replacing inventory because it is based on the historic cost of that inventory. For an estimate of earnings to be considered real, it must be determined using a current cost (sometimes called replacement cost) accounting system. If we assume that it would have actually cost £800,000 more to produce the goods Company Θ sold given today's input prices, an accounting adjustment, α_0, for Company Θ would be -£800,000.

An example can also be used to illustrate the importance of an accounting adjustment, α_0, for depreciation expense. Assume Company **Ω** is a Eurozone company that purchases fixed assets of €200 million and will follow IAS 16 which permits companies to measure property, plant, and equipment under a cost model (historical cost minus accumulated depreciation). The fixed assets will be 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 salvage value and market value of zero and will cost €210 million to replace. The company follows historical cost accounting conventions and reports depreciation expense of €100 million.

[1] One advantage of the FIFO method is that ending inventory will be reported at (close to) current cost. Most accountants would also contend that the FIFO method is an appropriate choice if the physical flow of goods is actually first-in, first-out.

Company Ω's reported 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. Using a current cost accounting system, the depreciable basis is the €210 million replacement cost of the fixed assets and the depreciation charge is €105 million a year (instead of €100 million). The accounting adjustment, α_0, for Company Ω in this example would be –€5 million.

As first noted by Modigliani and Cohn (1979), the debt adjustment, ρD_0, reflects the impact that inflation has on the real value of creditor claims. These authors make the case that a significant portion of a firm'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 in the presence of inflation. The earnings reported by leveraged firms will then overstate the true cost of debt because they 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) refer to this problem as *the debt capital gain error*. These authors make the case that the cash flow from this benefit can be easily captured if a firm simply keeps the real value of its debt constant. This is accomplished by issuing new debt each period in the amount of the expected rate of inflation, ρ, times beginning of period debt, D_0. The net gain to shareholders is reflective of the fact that nominal interest on debt is a tax-deductible expense, whereas the cash flow from issuing new debt is untaxed.

An example demonstrates the importance of the debt adjustment, ρD_0. Assume Swedish Company Δ has assets worth kr1 billion that are financed with kr600 million of debt and kr400 million of equity. Company Δ 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 15 percent, which reflects a real cost of debt of 11 percent and an inflation premium of 4 percent that is equivalent to the expected rate of inflation, ρ.[2] Company Δ's tax rate is 28 percent.

The nominal interest expense for Company Δ in the current time period is kr90 million, of which kr66 million is the real cost of debt and kr24 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 kr17.28 million.

In one year's time, inflation will cause the nominal value of Company Δ's assets to rise by kr40 million to kr1.04 billion. To maintain the current capital structure of 60 percent debt, Company Δ issues an additional or kr24 million of debt, raising the total to $624 million. The cash flow from the new debt issue is untaxed, so the net effect of inflation on Company Δ's shareholders is the kr24 million of additional debt less the after-tax cost of kr17.28 million for compensating creditors for inflation, or kr6.72 million. Effectively, the tax code allows Company Δ to expense the inflation compensation paid to creditors, yet the cash flow from issuing new debt is untaxed.

For the above reasons, the adjusted earnings yield formula should be considered important. At the very least, the numerator of equation (1) should raise concerns about the veracity of reported earnings as a measure of a firm's true profitability. One has to wonder if pricing problems might exist simply due to investors' reliance on reported

[2] For simplicity, we assume the nominal rate of interest is the real rate of interest plus the expected rate of inflation. We have ignored the cross-product term from the well-known Fisher (1930) effect.

earnings. In a survey of U.S. security analysts, Block (1999) noted earnings were preferred over cash flow, dividends, and book value as a valuation input.

Model Specification and Estimation Methodology

Equation (1) may be rewritten as Equation (2) below. Equation (2) indicates that real return is a function of three variables: (1) the earnings yield, $\frac{NI_0}{S_0}$; (2) the ratio of accounting adjustments-to-market capitalization, $\frac{\alpha_0}{S_0}$; and, (3) the ratio of the debt adjustment-to-market capitalization, $\frac{\rho D_0}{S_0}$. Our regression models are based on equation (2). We examine two accounting adjustments, one to cost of goods sold and one to depreciation expense. Because of this, there are two accounting adjustments, $\frac{\alpha_0}{S_0}$, in our regression model.

$$R = \frac{NI_0}{S_0} + \frac{\alpha_0}{S_0} + \frac{\rho D_0}{S_0} \qquad (2)$$

Of particular importance for this research is the statistical significance of the coefficient estimates for the accounting adjustments, $\frac{\alpha_0}{S_0}$, and debt adjustment, $\frac{\rho D_0}{S_0}$, in our predictive regressions. Our results do show that these coefficient estimates are statistically significant. Thus, the recommended adjustments to reported earnings should be considered important by investors.

The predictive regression models we specify are noted in equation (3) below. The time subscripts, *t-2*, *t-1*, and *t*, are indicative of beginning-of-the- previous-year, beginning-of-year, and end-of-year data, respectively. The time subscript $t\text{-}1 \rightarrow t$ indicates a result or forecast for a one-year time period (beginning-of-year to end-of-year). Following equation (3) is a discussion of the dependent variable and each of the explanatory variables used in the model. Accounting and return data is available from the Compustat® Global Data database and the footnotes contain the data items used to determine our variables.

$$R_{t-1\to t} = \sum_{i=1}^{n} \delta_i + \beta_1 EY_{t-1} + \beta_2 COGSadj_{t-1} + \beta_3 DEPadj_{t-1} + \beta_4 DEBTadj_{t-1} + \varepsilon_{t-1\to t} \qquad (3)$$

Real Return: ***$R_{t-1\to t}$***. We determine nominal return, $r_{t-1\to t}$, in the local currency based on equation (4) below. $PRICE_t$ is computed as the stock price at the end of the fiscal year plus dividends received during the year divided by an adjustment factor, all in the local currency. $PRICE_{t-1}$ is computed as the stock price at the beginning of the fiscal year divided by an adjustment factor, both in the local currency. 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.[3]

$$r_{t-1\to t} = \frac{PRICE_t}{PRICE_{t-1}} - 1 \qquad (4)$$

Real return, $R_{t-1\to t}$, is nominal return, $r_{t-1\to t}$, adjusted for inflation. We use a rate, $CPIinf_{t-1\to t}$, based on the local Consumer Price index (CPI).[4] Data for the CPI is available from many sources including the Organization for Economic Co-operation and Development (OECD) (http://www.oecd.org/). Real return, $R_{t-1\to t}$, is determined using equation (5).

[3] The Compustat® data items used for $PRICE_t$ and $PRICE_{t-1}$ are price-fiscal year-end month of data (PRCCM), dividends per share by ex-date-end month of data (DVPSXM), and adjustment factor-cumulative-by ex-date (AJX11 or AJX12).
[4] We also deflated nominal returns using the Gross Domestic Product (GDP) Implicit Price Deflator without substantially affecting our results. These results are available from the authors by request.

$$R_{t-1\rightarrow t} = \frac{(1 + r_{t-1\rightarrow t})}{(1 + CPI\inf_{t-1\rightarrow t})} - 1 \qquad (5)$$

<u>Intercept and Dummy Variables</u>: $\sum_{i=1}^{n} \delta_1$. We report results for four different specifications for the regression model indicated by equation (3). Every specification includes an intercept term. The specifications vary depending on whether country, year, and industry dummy variables are included in the analysis.

<u>Earnings Yield</u>: EY_{t-1}. We define the earnings yield, EY_{t-1}, as net income (loss), NI_{t-1}, divided by market capitalization, S_{t-1}, as noted in equation (4), both in the local currency. Net income (loss), 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. [5]

$$EY_{t-1} = \frac{NI_{t-1}}{S_{t-1}} \qquad (4)$$

<u>Cost of Goods Sold Adjustment</u>: $COGSadj_{t-1}$. For our purposes, the physical change in inventories during a period should be valued at current period prices. In practice, most companies adopt inventory valuation methods that rely to some degree on historical costs. 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 this research, the last-in last-out (LIFO) inventory method would be the valuation method that is closest to being theoretically correct because it uses recent prices

[5] The Compustat® data items used for NI_{t-1} is determined as Income Before Extraordinary Items (IB) – Extraordinary Items (XI) – Discontinued Items (DO). Compustat® data items used to determine market capitalization, S_{t-1}, are price-fiscal year-end month of data (PRCCM) and common shares outstanding (CSHO).

to determine cost of goods sold. The LIFO method assumes the last goods purchased are the first goods used (in a manufacturing concern) or the first goods sold (in a merchandising firm). Of greatest concern are those firms who use the first-in first-out (FIFO) inventory method.[6] The FIFO inventory method assumes that the first goods purchased are the first goods used or sold. Thus, the FIFO inventory method understates replacement cost in the presence of inflation.

We determine the annual rate of inflation for inventories based on the local Gross Domestic Price (GDP) Implicit Price Deflator, IPD_t, and use it to adjust beginning inventory, INV_{t-2}, for inflation. Data for the GDP Implicit Price Deflator is available from the Organization for Economic Co-operation and Development (OECD) (http://www.oecd.org/). The degree of adjustment is dependent on the importance of the FIFO method to a company's inventory valuation. Our adjustment is identical to that appearing in Palkar and Wilcox (2009) and similar to that used by studies that determine the replacement cost of inventory for the purposes of estimating Tobin's q (see, for example, Servaes 1991 and citations appearing in that paper).

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 a FIFO weight, w_{t-1}, of zero if Compustat® does not list FIFO as a reported inventory method.

--INSERT TABLE 1--

[6] Of the 21,063 observations in our sample, 5,016 of these observations had a FIFO rank of one (23.8 percent) and 23 had a FIFO rank of two (0.1 percent).

Our cost of goods sold adjustment, $COGSadj_{t-1}$, is determined using equation (5) where S_{t-1} is the market capitalization of the company's common shares with all financial data in the local currency.[7]

$$COGSadj_{t-1} = \frac{\left(\frac{IPD_{t-1}}{IPD_{t-2}} - 1\right)(INV_{t-2})(w_{t-1})}{S_{t-1}} \tag{5}$$

<u>Depreciation Expense Adjustment</u>: *DEPadj*$_{t-1}$. In this section, we make use of a methodology used by Ritter and Warr (2002) that converts financial statement depreciation charges to an approximation of current cost depreciation. Estimating the depreciation adjustment requires several simplifying assumptions: (1) depreciable life is equal to economic life; (2) straight-line depreciation accurately reflects the consumption of an asset's economic benefits; and, (3) the inflation rate has been constant over the life of the assets.

Assuming straight-line depreciation, the average life of fixed assets, AL_t, can be determined using equation (6) where $PPEgross_t$ is the gross value of property, plant, and equipment and DEP_t is depreciation expense. Average life, AL_t, is rounded to the nearest whole year.

$$AL_t = \frac{PPEgross_t}{DEP_t} \tag{6}$$

The depreciation expense adjustment, $DEPadj_{t-1}$, is then determined by equation (7) where $FCFD_t$ is the local private non-residential fixed capital formation, deflator and S_{t-1} is the market capitalization of the company's common shares where all data is in the

[7] The Compustat® data items used to determine the numerator of equation (5) are: inventories-total (INVT) and inventory valuation method (INVVAL). Compustat® data items used to determine market capitalization, S_{t-1}, are price-fiscal year-end month of data (PRCCM) and common shares outstanding (CSHO).

local currency. Data for the private non-residential fixed capital formation, deflator is available from the OECD (http://www.oecd.org/). [8]

$$DEPadj_{t-1} = \frac{DEP_{t-1}\left(\frac{FCFD_t}{FCFD_{t-AL_t}} - 1\right)}{S_{t-1}} \tag{7}$$

<u>Debt Adjustment</u>: *$DEBTadj_{t-1}$*. Modigliani and Cohn (1979) were the first to note that fully-expected inflation results in 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 pre-tax operating income paid in taxes declines as the rate of inflation rises.

Our debt adjustment variable is determined using equation (8). Data for the expected rate of inflation, $\rho_{t-1\rightarrow t}$, is the one-year-ahead inflation forecasts for the GDP deflator available from the OECD. Following Wilcox (2007), we use a company's total debt as the measure of beginning-of-year debt, D_{t-1} as reported in the local currency. As before, S_{t-1} is the market capitalization of the company's common shares in the local currency.[9]

$$DEBTadj_{t-1} = \frac{\rho_{t-1\rightarrow t} D_{t-1}}{S_{t-1}} \tag{8}$$

[8] Compustat® data items used to determine equation (6) are property, plant, and equipment-total (gross) (PPEGT) and depreciation and amortization (DP). Depreciation and amortization (DP) is also used to determine equation (7). In equation (7), Compustat® data items used to determine market capitalization, S_{t-1}, are price-fiscal year-end month of data (PRCCM) and common shares outstanding (CSHO).

[9] The Compustat® data items use to determine total debt in the numerator of equation (8) are the sum of debt in current liabilities (DLC), accounts payable (AP), income taxes payable (TXP), current liabilities-other (LCO), long-term debt-total (DLTT), liabilities-other (LO), deferred taxes (TXDP), minority interest (MIB), and preferred stock (PSTK). Compustat® data items used to determine market capitalization, S_{t-1}, are price-fiscal year-close (199) and common shares outstanding (25).

Data and Summary Statistics

We construct our sample from the annual Compustat® Global database. We rely on annual data for this study because quarterly data from Compustat® are not audited and are less comprehensive. Although the Compustat® database contains 20 years of data, our sample is constrained to begin in 1999 by survey data availability for the expected rate of inflation, $\rho_{t-1\rightarrow t}$, needed for the debt adjustment, $DEBTadj_t$. Thus, our sample begins in 1999 and ends in 2007.[10]

We follow the standard practice of excluding financial companies by including only industrial companies as determined by Compustat®[11] We require companies to have a CUSIP matching in Compustat® and CRSP. Companies with a missing book value of total assets and/or a missing book value of equity are removed from the sample. We also remove company-year observations with missing or zero values for market capitalization, net income (loss), and depreciation and amortization.[12] We follow Baker and Wurgler (2002) and delete company-year observations with book value of total assets less than $10 million and a market-to-book ratio greater than 10. The final dataset is an unbalanced panel set comprising of 21,063 company-year observations consisting of 4,423 companies with an average of 3.77 years (median of 3 years) of data per company. **Table 2** presents the observations for each European country in our sample and also the number of observations for each year of our sample.

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[10] We also created a data set that assumed perfect foresight in that expected inflation was assumed to be the actual next year percentage change in the local GDP price deflator based on OECD data. The duration of this data set was from 1989 to 2007 and the regression results were substantially the same as those presented in this paper. These results are available upon request from the authors.
[11] A recent example of a study excluding data for financial institutions and utilities is Flannery and Rangan (2006).
[12] These company-year observations were removed because market capitalization, net income (loss), and depreciation and amortization are important determinants of the adjusted earnings yield.

--INSERT TABLE 2--

Table 3 presents the summary statistics for our sample. The mean (annual) real return ($R_{t\text{-}1\rightarrow t}$) for companies in our sample was 37.5 percent with a median (annual) real return of 8.2 percent. The mean and median earnings yield ($EY_{t\text{-}1}$) was -0.6 percent and 5.1 percent respectively. The data for the accounting adjustments ($COGSadj_{t\text{-}1}$ and $DEPadj_{t\text{-}1}$) suggest these adjustments could significantly alter the forecast for a company's real expected return. The mean debt adjustment ($DEBTadj_{t\text{-}1}$) was 1.5 percent.

--INSERT TABLE 3--

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

The correlations reported in **Table 4** are mostly consistent with our expectations. Interestingly, the earnings yield, $EY_{t\text{-}1}$, is negatively correlated with real return, $R_{t\text{-}1\rightarrow t}$. For the adjustments ($COGSadj_{t\text{-}1}$, $DEPadj_{t\text{-}1}$, and $ACCTadj_{t\text{-}1}$) all of the correlations are of the expected sign. The debt adjustment, $DEBTadj_{t\text{-}1}$, has the strongest correlation with real return, $R_{t\text{-}1\rightarrow t}$, with a correlation coefficient of 0.04.

--INSERT TABLE 4--

Regression Results

In **Table 5**, we report the regression results for the predictive regression models specified by equation (3). The traditional ordinary-least-squares (OLS) *t*-test statistics for these models are unreliable due to concerns over the likely existence of hetereoskedasticity and serial correlation. We address these concerns by adopting the Newey-West (1987) correction. This procedure produces a general hetereoskedastic and autoregressive consistent covariance matrix for OLS regression analysis. We refer to results that make use of this correction as Newey-West (NW) regression results in **Table 5**.

The use of seasonal dummies is widespread in the Finance literature due to various calendar effects on share prices. To control for effects peculiar to a particular year, we assign a 1-0 dummy variable to each year's observations. Following the classification system used by Fama and French (1997), we use a 1-0 dummy variable to control for industry effects by assigning firms to a specific industry based on their four-digit SIC codes. Finally, we also assign a 1-0 dummy variable to control for country effects.

For specifications where we make use of one fixed effect (either the year or the industry dummies are included in the analysis, but not both), we drop one of the dummy variables and include an intercept in the specification. For specifications where we have two fixed effects (both the year and industry dummies are included in the analysis), we drop one dummy variable for each of the two fixed effects and include an intercept in the specification.

--INSERT TABLE 5--

Our regression results are consistent with those in Wilcox (2007) and Palkar and Wilcox (2009). In **Table 5**, Newey-West regression (1) does not include country, year, or industry dummy variables. All of the coefficient estimates are of the predicted sign. The coefficient estimate for the earnings yield, EY_{t-1}, is not statistically significant at the

10 percent level. The coefficient estimates for the accounting adjustments, $COGSadj_{t-1}$, $DEPadj_{t-1}$, and the debt adjustment, $DEBTadj_{t-1}$, are statistically significant at the 5 percent significance level or better.

Newey-West regression (2) includes country, but not year or industry dummy variables. Newey-West regression (3) includes country and year, but not industry dummy variables. Newey-West regression (4) includes all of the dummy variables. Consistent with the regression (1) results, the coefficient estimates for the earnings yield, EY_{t-1}, are not statistically significant at the 10 percent level in Newey-West regressions (2) through (4).

All of the coefficient estimates for the adjustments are of the predicted sign. The coefficient estimate for the cost of goods sold adjustment, $COGSadj_{t-1}$, is negative and statistically significant at the 1 percent significance level in Newey-West regressions (2) through (4). The depreciation expense adjustment, $DEPadj_{t-1}$, is statistically significant at the 5 percent significance level in Newey-West regressions (3) and (4) and at the 1 percent significance level in Newey-West regression (2). The debt adjustment, $DEBTadj_{t-1}$, is statistically significant at the 1 percent significance level in regressions (2) through (4).

We believe the **Table 5** Newey-West regression results provide evidence that should be of interest to most investors. First, the coefficient estimates for the earnings yield variable, EY_{t-1}, were never statistically significant in all of our Newey-West regressions. This result, in and of itself, allows one to question the usefulness of reported earnings as a valuation input for determining real return. There is overwhelming evidence that investment firms rely on such metrics as earnings-per-share (EPS) and the price-to-earnings ratio (P/E; the reciprocal of the earnings yield) when recommending securities (see Block 1999). One has to wonder if security analysis could be improved if more investment professionals simply recognized the limitations of reported earnings.

On the other hand, the coefficient estimates for the accounting and debt adjustments were statistically significant as noted in **Table 5**. Thus, the recommended adjustments to reported earnings should be considered important by investors. Our results are robust as the coefficient estimates for the accounting and debt adjustments are statistically significant at the 1 percent significance level (except in one incidence where the significance level is 5 percent) in all of our regressions.

Conclusion

The adjusted earnings yield formula predicts that real return is a function of the earnings yield and the accounting and debt adjustments necessary to convert the earnings yield to 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 other popular market valuation ratios. Palkar and Wilcox (2009) present methodologies that investors can use to estimate the accounting and debt adjustments for individual companies. The authors use a predictive regression model and the Compustat® North American database to show that that the adjustments should be considered important by investors.

In this research, we extend the work of Palkar and Wilcox (2009) to the valuation of European companies. For the accounting adjustments, we identify the use of the FIFO inventory valuation method as an accounting choice that would cause reported earnings to be greater than real earnings in a period of rising prices. We also identify that inflation results in reported earnings being greater than real earnings due to depreciation expense be based on acquisition cost. Our adjustments serve the purpose of converting reported cost of goods sold and depreciation expense to a current cost accounting system. Our accounting adjustments are based on measures used previously in the literature by Palkar and Wilcox (2009) or Ritter and Warr (2002).

For the debt adjustment, we rely on the adjustment first identified in Modigliani and Cohn (1979). Following Wilcox (2007) we use a company's total debt position as a measure of debt. Debt usage during a time period of rising prices results in reporting earnings being less than real earnings. This is because debt issuance is not taxed but the inflation compensation paid to creditors is a tax-deductible expense.

We use predictive regression models to test the importance of the accounting and debt adjustments as predictors of real returns. Our results do show that the coefficient estimates for the adjustments are statistically significant over the time period of the study. Thus, the recommended adjustments to reported earnings should be considered important by investors.

Appendix

The purpose of this appendix is to present an adjusted earnings-based approach for estimating the real expected return for equity. First, consider the case of a no-growth unlevered company, *U*. Subscripts are used to indicate the time period a cash flow or valuation occurs. Assume that Company *U* initially has a market value, V_0, and operates in a society that is free from the effects of inflation. 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). Note that net income, NI_0, is equivalent to earnings before tax, EBT_0, adjusted for taxes using the tax rate, *T*. Real expected return, R_U, can be determined as a earnings yield using equation (A2).

$$V_0 = \frac{NI_0}{R_U} = \frac{EBT_0(1-T)}{R_U} \tag{A1}$$

$$R_U = \frac{NI_0}{V_0} = \frac{EBT_0(1-T)}{V_0} \tag{A2}$$

Next, assume the existence of a fully-expected and perpetual inflation rate, *ρ*. The nominal expected return, r_U, can be determined using equation (A3) and the market value of the company at any future time period *n* can be determined using equation (A4).

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

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

Equation (A4) reduces to equation (A5) where $k \neq R_U$ and cannot be considered real if reported earnings before tax, EBT_n, is determined using historical cost accounting conventions for goods and services acquired in time periods prior to *n*. One example of such an accounting choice would be depreciation expense if it is based on the asset's acquisition cost. Another would be cost of goods sold if a company chooses the first-in first-out (FIFO) inventory valuation method.

$$V_n = \frac{NI_n}{k} = \frac{EBT_n(1-T)}{k} \tag{A5}$$

If historical cost accounting conventions are indeed used, then accounting adjustments, α_n, must be made to convert operating income to a current or replacement cost basis as in equation (A6) and real expected return, R_U, can be determined contemporaneously as an adjusted earnings yield using equation (A7).

$$V_n = \frac{NI_n + \alpha_n}{R_U} = \frac{EBT_n(1-T) + \alpha_n}{R_U} \tag{A6}$$

$$R_U = \frac{NI_0 + \alpha_0}{V_0} = \frac{EBT_0(1-T) + \alpha_0}{V_0} \tag{A7}$$

Examples abound in the literature where accounting adjustments, α_0 in equation (A7), are made in order to facilitate an accurate forecast of either real equity returns or real equity cash flows. Two of the more recent examples include Ritter and Warr (2002), Wilcox (2007), and Palkar and Wilcox (2009). Ritter and Warr (2002) made use of a company-level depreciation adjustment that grosses up depreciation expense based on the amount of inflation that has occurred over the life of the assets. Wilcox (2007) used the Capital Consumption Adjustment (CCadj) provided by the Bureau of Economic Analysis (BEA) to reflect the market-level difference between book and economic depreciation. Wilcox (2007) also used the BEA's Inventory Valuation Adjustment (IVA) to reflect the market-level difference between book and current cost inventory withdrawals. The cost of goods sold adjustment used in this paper was previously used in Palkar and Wilcox (2009).

Next, consider the case of a no-growth levered-company, *L*, and zero inflation. Assuming all earnings are paid out as dividends, the market value of Company *L*'s equity, S_0, is determined using equation (A8). Here net income, NI_0, is equivalent to earnings before interest and tax, $EBIT_0$, adjusted for taxes 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 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 using equation (A9).

$$S_0 = \frac{NI_0}{R_L} = \frac{(EBIT_0 - R_D D_0)(1-T)}{R_L} \tag{A8}$$

$$R_L = \frac{NI_0}{S_0} = \frac{(EBIT_0 - R_D D_0)(1-T)}{S_0} \tag{A9}$$

If a fully-expected and perpetual inflation rate, ρ, exists, the nominal cost for levered equity, r_L, can be determined using equation (A10). For simplicity of exposition and following Modigliani and Cohn (1979), we ignore the Fisher effect (1930) 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).

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

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

Equation (A11) indicates that inflation will have a negative impact on Company *L*'s net income via an increase in interest expense. The change in net income, ΔNI_0 due to inflation's impact on interest expense is determined by equation (A12). However, as noted by Ritter and Warr (2002), asset values will 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* will issue new debt in the amount of ρD_0. This 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, NCF_0, to shareholders is determined; it shows that inflation benefits the shareholders of levered companies.

$$\Delta NI_0 = -\rho D_0(1-T) \tag{A12}$$

$$NCF_0 = \rho D_0 - \Delta NI_0 = \rho D_0 T \tag{A13}$$

The debt adjustment, ρD_0, first appeared in the literature in Modigliani and Cohn (1979). Ritter and Warr (2002) note that any valuation approach that relies on GAAP-based reported earnings, NI_0, will be biased downward for levered firms in the presence of inflation unless explicit corrections, namely 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 time period *n*. As before with the discussion for Company *U*, equation (A14) reduces to equation (A15) where $k \neq R_L$ and cannot be considered real if earnings before interest and tax, $EBIT_n$, is determined using historical cost accounting conventions for goods and services acquired in time periods prior to *n*.

$$S_n = \sum_{t=n+1}^{\infty} \frac{(NI_n + \rho D_n)(1+\rho)^{t-n}}{(1+r_L)^{t-n}} = \sum_{t=n+1}^{\infty} \frac{\{[EBIT_n - r_D D_n](1-T) + \rho D_n\}(1+\rho)^{t-n}}{(1+r_L)^{t-n}} \tag{A14}$$

$$S_n = \frac{NI_n + \rho D_n}{k} = \frac{[EBIT_n - r_D D_n](1-T) + \rho D_n}{k} \tag{A15}$$

If historical cost accounting conventions are used, then accounting adjustments, α_n, most be made to convert earnings before interest and tax, $EBIT_n$, to a current or replacement cost basis as in equation (A16) and real expected return, R_L, can be determined contemporaneously as an adjusted earnings yield using equation (A17).

$$S_n = \frac{NI_n + \alpha_n + \rho D_n}{R_L} = \frac{\left[EBIT_n - r_D D_n\right](1-T) + \alpha_n + \rho D_n}{R_L} \quad \text{(A16)}$$

$$R_L = \frac{NI_0 + \alpha_0 + \rho D_0}{S_0} = \frac{\left[EBIT_0 - r_D D_0\right](1-T) + \alpha_0 + \rho D_0}{S_0} \quad \text{(A17)}$$

References

Baker, M. and J. Wurgler. 2002. "Market Timing and Capital Structure." *Journal of Finance*, vol. 57, no. 1 (February):1-32.

Block, S. 1999. "A Study of Financial Analysts: Practice and Theory." *Financial Analysts Journal*, vol. 55, no. 4, (July/August):86-95.

Fama, E., and K. French. 1997. "Industry Costs of Equity." *Journal of Financial Economics*, vol. 43, no. 2 (February):153-193.

Flannery, M., and K. Rangan. 2006. "Partial Adjustment toward Target Capital Structures." *Journal of Financial Economics*, vol. 79, no. 3 (March):469-506.

Fisher, I. 1930. *The Theory of Interest: As Determined by Impatience to Spend Income and Opportunity to Invest It.* New York: Macmillan Company.

Newey, W. and K. West. 1987. "A Simple Positive Semi-Definite, Hetereoskedasticity and Autocorrelation Consistent Covariance Matrix." *Econometrica*, vol. 55, no. 3 (May):703-708

Palkar, D. and S. Wilcox. 2009. "Adjusted Earnings Yields and Real Rates of Return." *Financial Analysts Journal*, forthcoming.

Ritter, J., and R. Warr. 2002. "The Decline of Inflation and the Bull Market of 1982–1999." *Journal of Financial and Quantitative Analysis*, vol. 37, no. 1 (March):29–61.

Servaes, H. 1991. "Tobin's q and the Gains from Takeovers." *Journal of Finance*, vol. 46, no. 1 (March):409-420.

Wilcox, S. 2007. "The Adjusted Earnings Yield." *Financial Analysts Journal*, vol. 63, no. 5 (September/October):54-68.

Table 1. FIFO Weights

Reported Number of Inventory Methods	Rank of FIFO	Weight (w_t) of FIFO
1	1	1
1	NR	0
2	1	2/3
2	2	1/3
2	NR	0
3	1	3/6
3	2	2/6
3	3	1/6
3	NR	0
4	1	4/10
4	2	3/10
4	3	2/10
4	4	1/10
4	NR	0
5	1	5/15
5	2	4/15
5	3	3/15
5	4	2/15
5	5	1/15
5	NR	0

Note: NR-not reported

Table 2. Breakdown of Observations

Country	Observations	Year	Observations
Austria	396	1999	1,998
Belgium	547	2000	2,070
Czech Republic	87	2001	2,190
Denmark	631	2002	2,360
Finland	660	2003	2,484
France	3,172	2004	2,469
Germany	2,249	2005	2,525
Greece	533	2006	2,511
Hungary	109	2007	2,456
Iceland	13	Total	21,063
Ireland	134		
Italy	1,248		
Luxembourg	102		
Netherlands	887		
Norway	622		
Poland	168		
Portugal	235		
Slovak Republic	11		
Spain	782		
Sweden	1,124		
Switzerland	1,000		
Turkey	227		
United Kingdom	6,126		
Total	21,063		

Table 3. Summary Statistics: 1997-2007 (21,063 Company-Year Observations)

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
$R_{t-1\to t}$: Real return	0.37463	0.08167	2.66925	-0.99997	151.96572
EY_{t-1} : Earnings yield	-0.00555	0.05132	0.64708	-49.75619	6.34624
$COGSadj_{t-1}$: COGS adjustment	0.00165	0	0.01294	-0.01700	1.00930
$DEPadj_{t-1}$: Depreciation expense adjustment	0.00051	0	0.01474	-0.54284	0.50160
$DEBTadj_{t-1}$: Debt adjustment	0.01530	0.00556	0.06092	-0.01499	4.78809

Table 4. Correlation Matrix: 1997-2007 (21,063 Company-Year Observations)

	$R_{t-1\to t}$	EY_{t-1}	$COGSadj_{t-1}$	$DEPadj_{t-1}$	$DEBTadj_{t-1}$
$R_{t-1\to t}$: Real return	1.00000				
EY_{t-1} : Earnings yield	-0.00964	1.00000			
	(0.1617)				
$COGSadj_{t-1}$: COGS adjustment	-0.04380	-0.03057	1.00000		
	(< 0.0001)	(< 0.0001)			
$DEPadj_{t-1}$: Depreciation expense adjustment	-0.01055	0.04248	0.07489	1.00000	
	(0.1259)	(< 0.0001)	(< 0.0001)		
$DEBTadj_{t-1}$: Debt adjustment	0.04040	-0.21994	0.42879	0.02117	1.00000
	(< 0.0001)	(< 0.0001)	(< 0.0001)	(0.0021)	

Note: significance levels in parentheses.

Table 5. Newey-West (NW) Regression Results: 1997-2007 (21,063 Company-Year Observations)
Dependent Variable: $R_{t-1\rightarrow t}$: Real Return

Explanatory variables	Regression #1 β_i estimate (NW *t*-statistic)	Regression #2 β_i estimate (NW *t*-statistic)	Regression #3 β_i estimate (NW *t*-statistic)	Regression #4 β_i estimate (NW *t*-statistic)
Intercept	0.349	0.537	0.178	0.427
	(18.50***)	(3.58***)	(1.17)	(1.76***)
EY_{t-1}: Earnings yield	0.006	-0.002	0.002	-0.002
	(0.18)	(-0.07)	(0.06)	(-0.07)
$COGSadj_{t-1}$: COGS adjustment	-5.200	-4.933	-4.758	-4.488
	(-3.06***)	(-2.78***)	(-2.67***)	(-2.47***)
$DEPadj_{t-1}$: Depreciation expense adjustment	-1.777	-2.201	-2.034	-2.120
	(-2.13**)	(-2.38***)	(-2.20**)	(-2.24**)
$DEBTadj_{t-1}$: Debt adjustment	2.266	2.173	2.169	2.137
	(2.92***)	(2.67***)	(2.70***)	(2.51***)
Country dummy variables	No	Yes	Yes	Yes
Year dummy variables	No	No	Yes	Yes
Industry dummy variables	No	No	No	Yes
Adjusted R-squared	10.21%	10.75%	11.43%	11.41%

Notes: The model tested is $R_{t-1\rightarrow t} = \sum_{i=1}^{n}\delta_i + \beta_1 EY_{t-1} + \beta_2 COGSadj_{t-1} + \beta_3 DEPadj_{t-1} + \beta_4 DEBTadj_{t-1} + \varepsilon_{t-1\rightarrow t}$. Every specification includes an intercept term. The specifications vary depending on whether country, year and/or industry dummy variables are included in the analysis. The Newey-West *t*-statistic is in parentheses. ***, **, and * indicate statistical significance at the 1 percent, 5 percent, and 10 percent level, respectively.