The Association Between Stock Returns and Dilutive Earnings Per Share Numbers: A Reexamination

Dr. Scott I. Jerris, Accounting, Southern Methodist University

Abstract

Since 1969 generally accepted accounting principles have required firms with complex capital structures to disclose both primary and fully diluted earnings per share numbers. The purpose of this paper is to investigate whether a hypothesized benchmark, raw (basic) earnings per share, is more associated with stock price movements than these two required dilutive earnings numbers. Results show that the benchmark earnings per share number is more associated with stock returns than either primary or fully-diluted.

I. Introduction

In 1969 the Accounting Principles Board (APB) of the American Institute of Certified Public Accountants issued Opinion No. 15, Earnings Per Share. The pronouncement required firms with complex capital structures to present on the face of the income statement two earnings per share numbers.[1] The first, primary earnings per share (PEPS), is based on the assumption that common stock equivalents are converted at the beginning of the year. The second, fully diluted earnings per share (FDEPS), is based on the assumption that all potentially dilutive securities are converted into common stock at the beginning of the fiscal year. In issuing the opinion, the Board hoped that the increased disclosure would give all potential users information as to the impact of dilutive securities on earnings per share.

For the computation of PEPS, a security whose value was "derived in large part from the value of the common stock to which it is related (AICPA, 1969, paragraph 25)" was to be treated as a common stock equivalent. Examples of this are warrants, options, and stock rights. As far as convertible debentures are preferred stock, if the effective of the security is less than two-thirds of the effective yield on an average Aa bond, then that security is deemed a common stock equivalent.[2] When a security is classified as a common stock equivalent, it does not necessarily imply that conversion is surely to occur. "Neither conversion nor the imminence of conversion is necessary to cause a security to be a common stock equivalent (AICPA, 1969, paragraph 25)."

The aim of this paper is to test the alternative hypothesis that one or both of the dilutive earnings numbers provide incremental information content beyond a hypothesized benchmark, raw earnings per share, to the users of accounting information. Raw earnings per share (REPS) is defined as net income available for common divided by the number of common shares outstanding at the end of the fiscal period. If the rules of Opinion No. 15 are poor predictors of future conversions, primarily the two-thirds rule, or if the accounting earnings from the REPS serves are better surrogates of realized or future cash flows, then it is unlikely that the alternative hypothesis will be accepted in favor of the null. The findings of this research fail to reject the null hypothesis.

II. Literature Survey

The Reaction to APB Opinion No. 15

There has been substantial criticism of APB Opinion No. 15 on theoretical grounds since its issuance in 1969. Much of the criticism centers on the Board's choice of criteria in determining common stock equivalence (Frank and Weygandt (1970), (1971), Arnold and Humann (1973), Sterner (1983), Bierman (1986), and Gaumnitz and Thompson (1987)). Stock options and warrants are always classified as common stock equivalents provided their dilutive effects are material. In order for convertible debentures and preferred stock issues to be classified as common stock equivalents, it is necessary that their cash yield rate be less than two-thirds the average yield on a Aa corporate bond at the time of issuance. Once a determination of common

stock equivalency status is made, either positive or negative, that status remains until the security is converted or retired. Thus it is entirely possible under the rules of APB Opinion No. 15 that two issues of the same issuing firm, equivalent in every respect and treated by the market as identical, would have opposite treatments in the calculation of primary earnings per share due to either a change in the term structure of interest rates or of a change in the credit rating of the firm.[3]

Dilution of the EPS measure only takes place through actual conversion. Hence, common stock equivalents should be those securities for which conversion is to be expected within a reasonable period of time. Many researchers empirically tested whether the two-thirds cash yield rule was a good predictor of future conversion. Frank and Weygandt (1970) found that none of the convertible debentures that met the two-thirds cash yield rule in 1965 subsequently converted the following year. In a later study, Sterner (1983) found that out of seventeen convertible bonds classified as common stock equivalents by the modified two-thirds cash yield rule, eleven issues experienced some degree of partial conversion. In addition, out of thirty-nine convertible bonds that were not classified as common stock equivalents, seventeen issues exhibited no degree of partial dilution. Thus the Board's classification procedure exhibited a fifty percent error rate.

In trying to improve upon the Board's classification procedure for common stock equivalency status, many researchers attempted to identify superior classification schemes using multiple discriminant analysis. Frank and Weygandt (1971) found that use of a convertible debenture's conversion value to call price ratio was a better indicator of future conversion than the two-thirds cash yield rule. Similarly, Arnold and Humann (1973) examined two alternative methods that the Board rejected in its Opinion No. 15, the market parity and the investment value methods, in their ability to discriminate between those convertible bonds that ultimately will convert from those that will not convert. The authors found that the investment value method did not generate any predictive power for the convertible debentures in the sample while the predictive power for the market parity method was found to be unreliable and low. More recently, Gaumnitz and Thompson (1987) have suggested an alternative to the two-thirds rule of classifying convertible debentures as common stock equivalents. These authors argue that a convertible is a common stock equivalent if and only if it is priced in the market essentially as though it were a common stock. Through theoretical models of convertible debenture valuation and regression analyses, Gaumnitz and Thompson (1987) claim to achieve a better classification scheme than those currently required under generally accepted accounting principles.

Opinion No. 15 and Stock Returns

APB Opinion No. 15 required firms with complex capital structures to report two earnings per share numbers, primary earnings per share (PEPS) and fully diluted earnings per share (FDEPS). The primary measure is affected only by common stock equivalents while the latter is affected by all potentially dilutive securities. Accounting researchers have empirically investigated whether the latter measure conveys additional information content once primary has been reported.

The first empirical study to examine the incremental information content of FDEPS was Rice (1978). In his study 187 firms were classified into the "experimental" group while 152 firms were classified into the "control" group. The "experimental" group consisted of those firms which FDEPS < PEPS for the first fiscal year in which Opinion No. 15 was required, 1969, while the "control" group consisted of those firms which FDEPS = PEPS. Abnormal returns were cumulated monthly for the two groups around each sample firm's earnings announcement date. Defining year 0 as the first fiscal year which Opinion No. 15 was mandated, the cumulative abnormal return for the "experimental" group was significantly greater, at the 5% level, than those for the "control" group during years -1, 0, and +1. No significant differences were found for the succeeding years +2 and +3. From these results it appears that the market has reacted at some time to the FDEPS measure. Hence Rice (1978) concludes that FDEPS has information content.

Since each firm has to report both FDEPS and PEPS, Kross, Chapman, and Strand (1980) felt that defining "experimental" and "control" groups the way Rice (1978) did might have ignored confounding variables. These authors argue that by using each firm as its own control, any problems of omitted variables or misspecification of security returns models are mitigated. The authors posited that if FDEPS better incorporates market expectations regarding future conversions into common stock then security return changes would be more highly associated with FDEPS numbers than with PEPS numbers for a sample of firms that report both. An examination of the correlation between cumulative abnormal security returns and earnings forecast errors was made. The correlation between cumulative abnormal returns and unexpected earnings were significant at the 5% level for all years of the study, 1971-1974, for

both PEPS and FDEPS. However the correlation for FDEPS was not significantly greater than the correlation for FDEPS. Hence Kross, Chapman, and Strand (1980) could not claim incremental information content for FDEPS over PEPS, refuting the claim of Rice (1978).

Prior research cited above has pointed out the theoretical deficiencies in the dilutive earnings numbers reported on the financial statements, but the evidence is mixed regarding the information content issue. This research will reexamine the dilutive earnings numbers and investigate whether there exists an alternative EPS number that is more highly correlated with stock price movements than the two existing ones, PEPS and FDEPS. It is posited here that this alternative EPS measure is raw earnings per share (REPS), a number much easier to compute than either PEPS or FDEPS. The methodology used, discussed in detail below, is similar to that of Kross et al. (1980).

III. Data and Methodology

Sample Criteria

In this reexamination the years of interest are 1976 through 1979, those immediately succeeding the period used in Kross et al. (1980). This period was chosen so as to extend the Kross et al. (1980) study by using a comparable time frame and research methodology. Selection criteria are as follows: **(a)** FDEPS and PEPS must be available on the annual COMPUSTAT tape for fiscal years 1976-1979; **(b)** continuously listed on the monthly CRSP file for the years 1971-1980; **(c)** have a complex capital structure consisting of convertible debentures.

Criterion (a) allows the computation of annual earnings forecast errors (unexpected earnings) while criterion (b) allows the estimation of market model parameters. These estimates are then used to compute cumulative abnormal returns. Criterion (c) was used in order to achieve a similar research sample as those used in previous studies. The final research sample for this study contains 392 pooled observations on 101 firms.

Unexpected Earnings and Cumulative Abnormal Returns

Earnings forecast errors were computed for PEPS, FDEPS, and REPS using the random walk or martingale model. This model states that the best forecast of next year's earnings is this year's earnings:

$PEPS_{it} = PEPS_{it-1} + e_{it}$,
$FDEPS_{it} = FDEPS_{it-1} + e_{it}$,
$REPS_{it} = REPS_{it-1} + e_{it}$,

with the property that the expected value of eit equals zero.[4] Since annual data was used, an insufficient number of observations precluded the use of more sophisticated time-series models.[5]

In order to obtain an approximately equal scale of measurement for unexpected earnings, two deflators are used: the market price of common at the end of the previous fiscal year and the absolute value of the annual earnings forecast. Theoretical support for the price deflator is given in Christie (1987) while the absolute value of the forecast is used for comparison purposes. Define the two earnings forecast errors as:

$EFE1_{it} = (EPS_{it} - EPSF_{it})/P_{it-1}$
$EFE2_{it} = (EPS_{it} - EPSF_{it})/ABS(EPSF_{it})$

where:

EPS_{it} = actual REPS, PEPS, or FDEPS for firm i in year t,
$EPSF_{it}$ = forecasted REPS, PEPS, or FDEPS for firm i in year t,
P_{it-1} = market price of common for firm i in year t-1,
ABS = absolute value operator.

In order to generate abnormal security returns, the Sharpe (1963) market model will be used. The market model is a statistical description of the relation between the rate of return on security i (R_{it}) and the rate of return on a market portfolio of assets (R_{mt}) when the joint distribution of the rate of return and the market portfolio is bivariate normal. The model is specified as:

$R_{it} = a_i + b_iR_{mt} + u_{it}$

where:

R_{it} = the return on common for firm i in month t,
R_{mt} = the return on the market portfolio (CRSP securities index) in month t,
a_i, b_i = the parameters estimated,
u_{it} = the residual of the regression.

The beta (b_i) estimated is the relative risk of firm i while the u_{it} is interpreted as the residual or unsystematic return of security i in month t.

The market model parameters will be estimated for each firm in the sample for a time span of 40 months before the period in which the cumulative abnormal return (CAR) is computed. In this paper, abnormal security returns are cumulated for each firm from a period beginning nine months before the month of the annual earnings announcement and ending three months

after the earnings announcement where month zero is the month of the earnings announcement as it appears in the Wall Street Journal Index. Thus, the thirteen month cumulative abnormal return can be defined as:

$$CAR_i = \sum_{t=-9}^{t=+3} u_{it}$$

Two methods of computing abnormal returns are used to check the sensitivity of the research findings. The first model uses the CRSP (Center for Research on Security Prices) equally-weighted market return while the second uses the CRSP value-weighted return.

To attempt to reduce noise and measurement error associated with annual earnings forecast models, firms are grouped into portfolios based on the magnitudes of the deflated earnings forcast errors for each of the three earnings per share numbers: REPS, PEPS and FDEPS. To have roughly five firms in each portfolio, twenty portfolios are constructed for years 1976 and 1977, while nineteen portfolios are constructed for the last two years of this study. A rank of one is given to the portfolio with the lowest deflated earnings forecast errors while a rank of twenty or nineteen is given to the portfolios with the highest forecast errors, depending upon the particular year. Using each firm as its own control as described in Kross et al. (1980), tests are conducted to examine the strength of the association between cumulative abnormal returns and the ranks of the portfolios of the deflated earnings forecast errors for each of the four earnings per share measures. In all statistical tests, data from the four years of the study were pooled together so that a total of 392 observations were used.

The principal research hypothesis is that the raw earnings per share measure is positively correlated to abnormal stock returns after controlling for the two required earnings per share measures. The first test of this underlying hypothesis is a test of the difference between two correlation coefficients. Consider the following hypotheses:

H_{01}: $r(CAR_i, R_{Ri})t <= r(CAR_i, R_{Pi})t$
H_{a1}: $r(CAR_i, R_{Ri})t > r(CAR_i, R_{Pi})t$

H_{02}: $r(CAR_i, R_{Ri})t <= r(CAR_i, R_{FDi})t$
H_{a2}: $r(CAR_i, R_{Ri})t > r(CAR_i, R_{Fdi})t$
$t = 1976, ..., 1979$

where:

r = a correlation statistic,
CAR_i = CAR for firm i,
R_{Ri} = rank of the portfolio of REPS for firm i,
R_{Pi} = rank of the portfolio of PEPS for firm i,
R_{Fdi} = rank of the portfolio of FDEPS for firm i.

The correlation statistic used is the Pearson's correlation coefficient, since a test of differences between correlation coefficients can be made for that particular statistic. If raw earnings per share measures are more correlated with market movements than the two required measures, then the null hypotheses are expected to be rejected. The test statistic for the difference of two Pearson correlation coefficients is given by Ferguson (1976):

$$t_{N-3} = \frac{(r_{12}-r_{13})(1+r_{23})^{1/2}}{(2(1-r_{12}^2-r_{13}^2-r_{23}^2+2r_{12}r_{13}r_{23}))^{1/2}}$$

where:

t_{N-3} = t statistic with degrees of freedom equal to the number of observations minus three.
r_{xy} = the correlation between variables x and y.

Even if raw earnings per share explains a smaller portion of abnormal returns than do primary or fully diluted earnings per share, it is still possible that the raw measure could add significantly to the explanatory power of the two conventional measures. Thus, a second set of tests involve the following multiple regressions for the four years of the study:

$CAR_i = a_0 + a_1RR_i + a_2RP_i + U_i$,
$CAR_i = b_0 + b_1RR_i + b_2RFD_i + U_i$,
$CAR_i = c_0 + c_1RR_i + c_2RP_i + c_3RFD_i + U_i$

where:

CAR_i = CAR for firm i,
RR_i = rank of the portfolio of REPS for firm i,
RP_i = rank of the portfolio of PEPS for firm i,
RFD^i = rank of the portfolio of FDEPS for firm i,
U_i = residual term of the regression.

The following hypotheses are tested:

H_{03}: $a_1 <= 0; b_1 <= 0; c_1 <= 0$
H_{a3}: $a_1 > 0; b_1 > 0; c_1 > 0$

H_{04}: $a_2 <= 0; b_2 <= 0; c_2 <= 0; c_3 <= 0$
H_{a4}: $a_2 > 0; b_2 > 0; c_2 > 0; c_3 > 0$

The signs of each regression coefficient in the null and alternative hypotheses are tested separately, rather than jointly. If the REPS measure adds significant explanato-

ry power to the primary and/or fully diluted numbers, then a_1, b_1, or c_1 should be significantly positive. However, it is possible that collinearity between variables can lead to a failure to reject the null.

IV. Results

Pearson's correlation coefficients were computed for the two different specifications of the market model (equally-weighted market return = beq, value-weighted market return = bvw) and for each deflator (price and absolute value of the earnings forecast). The results of the correlation tests are given in table one.

All three EPS measures for each type of deflator and market model specification have significantly positive correlations between cumulative abnormal returns and unexpected earnings at confidence levels greater than 99% (alpha levels less than 1%). For example, the correlation coefficient for REPS under an equally-weighted market return and price deflator is 0.306. In all cases in table one, the magnitude of the correlation coefficient is highest for REPS as compared to the two required APB Opinion No. 15 benchmarks, PEPS and FDEPS. Furthermore in seven of eight cases, the correlation coefficient of REPS is significantly greater than that of PEPS or FDEPS. Hence H_{01} and H_{02} are rejected; changes in raw earnings per share are more correlated with stock price movements than either primary or fully diluted.

Ordinary least squares regressions throughout the four years of the study are presented in table two. In all twelve 7 regressions presented in table two, the REPS measure has a positive coefficient and is significantly different from zero at conventional levels of confidence ($a < .05$). Hence H03 is rejected since changes in REPS do explain changes in the dependent variable CAR. When REPS is paired against a single APB No. 15 measure in a regression, the APB #15 measure often has the wrong (negative) sign or is insignificantly different from zero. Panel A of table two shows negative significant coefficients while Panel B of table two shows coefficients insignificantly different from zero, mostly with negative signs. Notice when a regression is run with all three independent variables only REPS is significant while the coefficients of the others are again insignificant often with the wrong sign. All regressions have significant F - statistics.

V. Conclusions and Policy Implications

Two types of analyses were performed to assess whether the raw earnings per share measure was more associated with stock returns than those earnings per share numbers calculated from the ad hoc rules of APB Opinion No. 15, later amended by the FASB. These two analyses were correlation tests and multiple regressions. The correlation coefficients for REPS were larger in magnitude than that for PEPS or FDEPS and in seven of eight cases, statistically greater. In the multiple regressions run, the coefficient of REPS was always positive and significantly different from zero. The coefficients for the two required earnings often had the wrong (negative) sign and in cases where the absolute value of the earnings forecast was used as a deflator the coefficient was insignificantly different from zero. The conclusion reached was that raw earnings per share provided information content but that the incremental information content of the dilutive earnings per share numbers was found only in a few cases.

The results of this paper most definitely provide some policy implications to accounting standards and practice. Evidence is given here questioning the incremental information content of the earnings numbers mandated by APB Opinion No. 15. One cannot conclude that the number most correlated with stock returns is the "best" earnings measure, but one cannot ignore that the REPS results are quite strong. Previous research cited in section two, the ease of computation of REPS versus that of PEPS or FDEPS, coupled with the results of this paper should provide an impetus for accounting practitioners and standard setters to reexamine dilutive earnings per share measures currently required by generally accepted accounting principles.

Footnotes

1 Firms with complex capital structures are those that have issued potentially dilutive securities such as convertible debentures, convertible preferred stock, options, or warrants that upon conversion or exercise could in the aggregate materially dilute earnings per share.

2 FASB No. 55 replaces the two-thirds cash yield rule of APB Opinion No. 15 with the two-thirds effective yield rule.

3 Bierman (1986) suggests the inflexibility of common stock equivalency status may misrepresent the relevance of the conversion feature.

4 Abdel-Khalek & Thompson (1977) and Watts & Leftwich (1977) show that the martingale model is a reasonable predictor for annual earnings.

5 Analyst forecasts were also considered as a proxy for expectations but since analysts basically forecast only PEPS and not FDEPS nor RESP, the martingale model was used as a proxy for expectations.

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Table 1: Correlation Tests

Panel A: Price Deflator

βeq VAR	r	βvw VAR	r
R	.306***	R	.293***
P	.284***	P	.269***
FD	.281***	FD	.265***
TEST	**t**	**TEST**	**t**
R-P	2.405***	R-P	2.718***
R-FD	2.599***	R-FD	2.993***

Panel B: | Forecast | Deflator

βeq VAR	r	βvw VAR	r
R	.278***	R	.275***
P	.252***	FD	.252***
FD	.249***	P	.229***
TEST	**t**	**TEST**	**t**
R-P	1.224	R-P	2.159**
R-FD	2.448***	R-FD	1.922*

*significant at α < .05 (one-tailed test)
**significant at α < .025 (one-tailed test)
***significant at α < .01 (one tailed test)

Table 2: Multiple Regressions

Panel A: Price Deflator

	βeq		βvw	
	COEF	α	COEF	α
Intercept	-.1845	.000***	-.0882	.004***
R	.0413	.002***	.0480	.001***
P	-.0246	.034*	-.0309	.016**
	R^2 = .101		R^2 = .097	
	F = 21.901***		F = 20.867***	
Intercept	-.1865	.000***	-.0900	.003***
R	.0414	.001***	.0498	.000***
FD	-.0247	.027*	-.0327	.008***
	R^2 = .102		R^2 = .100	
	F = 22.132***		F = 21.490***	
Intercept	-.1849	.000***	-.0887	.004***
R	.0434	.001***	.0513	.001***
P	-.0091	.352	-.0072	.392
FD	-.0174	.227	-.0270	.136
	R^2 = .103		R^2 = .100	
	F = 14.770***		F = 14.381***	

Panel B: |Forecast| Deflator

	βeq		βvw	
	COEF	α	COEF	α
Intercept	-.1826	.000***	-.0857	.006***
R	.0147	.008***	.0209	.006***
P	.0001	.493	-.0059	.167
	R^2 = .078		R^2 = .078	
	F = 16.336***		F = 16.357***	
Intercept	-.1731	.000***	-.0888	.004**
R	.0301	.002***	.0254	.011**
FD	-.0150	.067	-.0099	.173
	R^2 = .083		R^2 = .078	
	F = 17.541***		F = 16.337***	
Intercept	-.1792	.000***	-.0847	.006***
R	.0296	.003***	.0257	.010***
P	.0061	.185	-.0040	.287
FD	-.0201	.052	-.0065	.296
	R^2 = .085		R^2 = .078	
	F = 11.950***		F = 10.978***	

*significant at α < .05 (one-tailed test)
**significant at α < .025 (one-tailed test)
***significant at α < .01 (one-tailed test)