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Is the Value Relevance of Accounting Information Consistently Underestimated?

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Abstract: This study investigates the importance of accounting for the sign of earnings as well as disaggregating earnings in empirical value relevance research. The paper presents evidence that value relevance as measured by the explanatory power of regression analysis more than doubles if both the sign and the disaggregation effect are incorporated into the analysis. Thus, traditional value relevance regressions may seriously understate the value relevance of accounting information. However, value relevance is not equally underestimated across sub-samples. Hence, the conclusions of prior studies that have compared value relevance between sub-samples from different time-periods, industries, countries, etc. may be biased.

Keywords: Value relevance, earnings, cash flow, accruals, loss.

1. INTRODUCTION

This paper presents evidence that the value relevance of accounting information may be severely underestimated in traditional value relevance studies. Prior empirical research has shown that value relevance increases if the sign of earnings is accounted for (Basu [1], Hayn [2], Joos and Plesko [3]) or if earnings are disaggregated into items (Barth, Beaver, Hand, and Landsman [4], Barth, Cram, and Nelson [5], Carnes [6], Ohlson and Penman [7]). This study illustrates that these effects are incremental to each other; if either of the effects is disregarded in the empirical analysis, accounting earnings may appear to explain far less of the variation in stock returns than they actually do. In fact, this paper shows that the value relevance as measured by explanatory power increases by 109% if earnings are disaggregated into items and the sign of earnings is accounted for in the analysis, compared to a traditional study where aggregate earnings without any adjustment for the sign of earnings are applied. The paper also demonstrates that the degree of underestimation may vary across sub-samples. Sub-samples are often compared in value relevance analyses, for instance in studies of value relevance over time (see, e.g., Collins, Maydew, and Weiss [8]), in different industries (e.g., Francis, Schipper, and Vincent [9]) or countries (e.g., Ali and Lee-Seok [10]), or in analyses of changes in value relevance after the introduction of new accounting standards (e.g., Hann, Heflin, and Subramanayam [11]). If such studies use regression models that consistently underestimate the value relevance of accounting information, and the degree of underestimation varies across sub-samples, the findings of the studies may be seriously biased.

Lev [12] assesses the usefulness of accounting earnings by evaluating a large number of studies on the relationship between stock returns and accounting earnings. He finds that most studies report a remarkably low statistical association between stock returns and current earnings. The explanatory power as measured by R^2 from regression analyses is often below 10%, and actually approaches zero in some cases. However, several papers have shown that the informational content of earnings is sign dependent (Basu [1], Hayn [2], Joos and Plesko [3]). Thus, the return-earnings association is not constant across earnings levels. Prior research (Francis, Schipper, and Vincent [9], Hayn [2]) suggests that the return-earnings association improves if the earnings response coefficient is allowed to be sign-dependent. Empirical studies have also documented that the value relevance of earnings may increase substantially as earnings are disaggregated into components (Barth, Beaver, Hand, and Landsman [4], Barth, Cram, and Nelson [5], Carnes [6], Ohlson and Penman [7]). This conclusion holds both as earnings are split into underlying line items (Carnes [6], Ohlson and Penman [7]) and as earnings are split into cash flow and accrual items (Barth, Beaver, Hand, and Landsman [4], Rayburn [13]). Pope [14] claims that earnings components generally do not "add up" in valuation, and in the case of losses, Joos and Plesko [3] maintain that investors generally do not consider losses to be homogeneous, but consider the causes and nature of the loss in assessing its long-term implications for firm value.

This study shows that both the sign effect and the aggregation effect are important, and none of them can be disregarded. The empirical findings illustrate that it is useful to account for the sign of earnings for all earnings aggregation levels and vice versa. It is generally useful to disaggregate earnings numbers even if the sign of earnings is taken into account. The vital contribution of the study is to show that the degree of underestimation of value relevance can vary across sub-samples, and, hence, studies of differences in value relevance may erroneously conclude that differences exist when this is actually not the case (and vice versa). The study is performed on a Norwegian sample, but

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1874-9151/10

this general conclusion is expected to hold in all countries with a high-quality accounting system and well-developed financial markets.

2. RESEARCH DESIGN AND DATA SAMPLE

Sub-section 2.1 discusses the regression specifications to be applied in the empirical study. Sub-section 2.2 presents the data sample.

2.1. Research Design

The purpose of this study is to investigate the combined effect of accounting for the sign of earnings and disaggregating earnings in value relevance research. Value relevance is tested using regression analysis of stock returns on accounting variables. Specifically, explanatory power (adjusted R^2) is used as the primary measure of value relevance. The adjusted R^2 of the regressions measures the proportion of the variance in stock returns explained by earnings variables. Easton and Harris [15] show that stock returns may theoretically be seen as a function of both the level and the change in earnings, and several empirical studies provide evidence that both the earnings number and its first difference is significantly related to stock returns (e.g., Francis, Schipper, and Vincent [9], Lev and Zarowin [16]). Thus, the Easton and Harris specification is applied in all regression analyses. The first set of regression specifications is:

$$RET_{i,t} = \beta_0 + \beta_2 X_{i,t} + \beta_3 \Delta X_{i,t} + \varepsilon_{i,t} \quad (1)$$

$RET_{i,t}$ is stock return for company i in year t, while $X_{i,t}$ is a vector of earnings variables. Three regressions with different earnings aggregation levels are run. In the first regression X = {EARN} where *EARN* is aggregate accounting earnings. This regression can be regarded as a traditional value relevance regression. In the second regression, earnings are split into cash flow and aggregate accruals such that X = {CF, ACC} where *CF* is total cash flows and *ACC* total accruals (compare Ali and Lee-Seok [10], Lev and Zarowin [16]). This breakdown is regarded as particularly interesting since *CF* generally is viewed as the objective part of the earnings number, whereas *ACC* is dependent upon accounting legislation and practice, as well as subjective judgment by accountants and managers. In the third regression, total accruals is split into major accruals items (compare Barth, Cram, and Nelson [5]). X = {CF, ΔWC, DEP, ΔDT} where *WC* is working capital, *DEP* is total depreciation and impairment and *DT* is deferred taxes. All earnings variables are scaled by the market value of equity at time t-1; the preferred scaling factor according to Easton and Sommers [17].

The first set of regression specifications measures the effect of disaggregating earnings into components. The second set of regression specifications allows all regression coefficients to be dependent upon the sign of earnings:

$$RET_{i,t} = \beta_0 + \beta_1 D_{i,t} + \beta_2 X_{i,t} + \beta_3 \Delta X_{i,t} + \beta_4 X_{i,t} D_{i,t} + \beta_5 \Delta X_{i,t} D_{i,t} + \varepsilon_{i,t} \quad (2)$$

$D_{i,t}$ is a dummy variable for the sign of earnings (a dummy for negative earnings in the Easton and Harris framework is used by for instance Francis, Schipper, and Vincent [9]). It is equal to 1 if earnings are negative, zero otherwise. Three dummy-regressions are run. The earnings vector is equal to {EARN}, {CF, ACC} and {CF, ΔWC, DEP, ΔDT}, respectively. In total, six regressions are run. The regressions make it possible to analyze the partial results of disaggregating earnings and accounting for the sign of earnings, as well as the combined results of both effects simultaneously. Note that the dummy variable *D* is dependent upon the sign of total earnings, not the sign of the individual earnings item. Income before extraordinary items is used as the measure of aggregate earnings. Following prior research (Biddle, Seow, and Siegel [18], Finger [19], Klein and Marquardt [20]), cash flow is defined as earnings minus accruals:

CF = Net income before extraordinary items (EARN) - Accruals (ACC)

where:

Accruals = Change in total working capital (ΔWC)[1]

- Change in deferred taxes (ΔDT)
- Depreciation and impairment (DEP)

2.2. Data Sample

The sample consists of firms listed on the Oslo Stock Exchange. All accounting data is obtained from the Oslo Stock Exchange's own accounting database for quoted companies. Stock price data is collected from the Norwegian School of Economics and Business Administration's Stock Market Database. All stock returns are adjusted for dividends, splits, etc. Stock values and returns are measured at the 30th of December of each year.[2] Observations are from 1992 to 2004. In 1992, Norwegian accounting legislation was changed to introduce deferred tax liabilities and assets (An "accounting revolution", see Hope [21]). A major tax reform was implemented at the same time. In 2005, European law required Norwegian quoted companies to report consolidated statements in accordance with International Financial Reporting Standards (IFRS). Because the introduction of IFRS may have influenced the structural relationship between stock returns and earnings numbers, IFRS observations are not included in this study.

Consistent with prior research, financial firms are excluded from the data sample. The original data sample consists of 1,661 observations. However, one observation is lost for each company when calculating change in earnings. One additional observation is lost when change in accruals is calculated (due to estimation of "change in change" of working capital and deferred taxes). Observations belonging to the upper or lower percentile of *RET*, *CF*, Δ*CF*, *ACC* and Δ*ACC* are deleted to avoid extreme observations having unreasonably large influence on the regression results. Due to a large degree of overlap among extreme observations, the actual number of observations deleted is 77, far less than the theoretical maximum of 10%. The final sample size is equal to 1,372 observations.

Table **1** summarizes descriptions of the variables used in this study. Panel **A** shows the distributional characteristics of the

[1] Change in current assets – Change in cash – Change in total current liabilities + Change in interest bearing short-term debt.

[2] In fact, prices from the last actual transactions are employed for all years. Hence, market data for the most illiquid stocks might be measured a few days prior to 30 December.

total sample. Mean earnings equals 1.2%[3] of the starting value of equity, while the median is equal to 2.3%. Mean earnings is comprised of 12.3% cash flow and –11.1% accruals. The standard deviation for earnings is less than the standard deviations for both cash flow and accruals. This indicates that accruals, to a certain extent, level out cash flow fluctuations. Depreciation is by far the most important item in accruals. The change in working capital is close to zero on average, but the dispersion is wide. Thus, the variable may be highly influential in the regression analyses despite its low mean. Mean stock return is high for this sample. However, the mean of 18.8% is accompanied by a standard deviation of 75.4%. Thus, the risk is substantial. Data for sales, total assets, and market value of equity are also provided in the table. Except for the fact that market value of equity is applied to scale the accounting variables, none of these variables are actually used in the empirical study. Still, they provide some indications of the distribution of company sizes in the sample. The companies are small on average. The turnover is slightly less than 4.5 billion NOK, while total assets equal 5.7 billion NOK. However, note the substantial standard deviations for these numbers. Oslo Stock Exchange is generally comprised of small companies, but some companies are considerably larger than the average.

Table 1. Descriptive Statistics

Panel A. Total Sample (n = 1372)

Variable	Mean	Q1	Median	Q3	St. Dev
EARN	0.012	-0.013	0.023	0.081	0.216
ΔEARN	0.029	-0.031	0.004	0.048	0.240
CF	0.123	-0.002	0.060	0.197	0.277
ΔCF	0.026	-0.059	0.005	0.106	0.357
ACC	-0.111	-0.160	-0.045	0.000	0.260
ΔACC	0.003	-0.077	-0.002	0.060	0.325
ΔWC	-0.007	-0.041	0.000	0.040	0.197
ΔΔWC	0.004	-0.065	-0.001	0.064	0.313
DEP	0.105	0.015	0.052	0.127	0.180
ΔDEP	-0.002	-0.004	0.002	0.015	0.115
ΔDT	-0.001	-0.003	0.000	0.004	0.052
ΔΔDT	0.003	-0.004	0.000	0.007	0.065
RET	0.188	-0.266	0.074	0.412	0.754
SALES	4 385	233	619	2 376	18 100
TOT. ASSETS	5 707	311	959	3 303	19 900
MV EQUITY	5 664	327	962	3 216	17 300

[3] Mean market deflated earnings is often not very high when long time horizons are applied. In a study of the predictive ability of accounting earnings of quoted companies in the USA, Kim and Kross [22] report mean deflated earnings of 0.7%. Their sample is drawn from the annual Compustat industrial file for the period 1973-2000 and includes more than 100,000 observations.

(Table 1) contd…..

Panel B. Positive Earnings (n = 945)

Variable	Mean	Q1	Median	Q3	St. Dev
EARN	0.087	0.020	0.055	0.110	0.111
ΔEARN	0.052	-0.009	0.010	0.054	0.186
CF	0.174	0.019	0.102	0.258	0.271
ΔCF	0.049	-0.038	0.013	0.111	0.286
ACC	-0.087	-0.144	-0.039	0.003	0.227
ΔACC	0.003	-0.064	-0.001	0.061	0.267
ΔWC	0.007	-0.030	0.002	0.048	0.180
ΔΔWC	0.007	-0.055	0.000	0.068	0.259
DEP	0.092	0.015	0.053	0.123	0.128
ΔDEP	0.000	-0.002	0.002	0.013	0.062
ΔDT	0.002	-0.002	0.000	0.007	0.041
ΔΔDT	0.003	-0.004	0.000	0.008	0.058
RET	0.303	-0.113	0.155	0.497	0.732
SALES	5 334	318	817	2 915	21 100
TOT. ASSETS	7 009	405	1 299	4 351	23 200
MV EQUITY	6 924	437	1 350	4 523	19 100

Panel C. Negative Earnings (n = 427)

Variable	Mean	Q1	Median	Q3	St. Dev
EARN	-0.155	-0.153	-0.065	-0.019	0.287
ΔEARN	-0.023	-0.116	-0.027	0.031	0.323
CF	0.010	-0.061	-0.003	0.058	0.255
ΔCF	-0.025	-0.111	-0.008	0.083	0.474
ACC	-0.165	-0.209	-0.056	-0.090	0.315
ΔACC	0.002	-0.100	-0.007	0.059	0.426
ΔWC	-0.039	-0.069	-0.006	0.022	0.228
ΔΔWC	-0.002	-0.083	-0.006	0.054	0.409
DEP	0.136	0.014	0.049	0.149	0.258
ΔDEP	-0.006	-0.010	0.001	0.021	0.184
ΔDT	-0.009	-0.011	0.000	0.000	0.070
ΔΔDT	0.002	-0.008	0.000	0.004	0.078
RET	-0.066	-0.517	-0.243	0.165	0.740
SALES	2 285	119	370	1 158	8 030
TOT. ASSETS	2 826	170	584	1 426	8 462
MV EQUITY	2 873	186	512	1 502	12 100

(Table 1) contd…..

Panel D. Pearson Correlation Matrix

	EARN	ΔEARN	CF	ΔCF	ACC	ΔACC	ΔWC	ΔΔWC	DEP	ΔDEP	ΔDT	ΔΔDT	RET
EARN	**1.00**	0.07	**0.33**	**0.23**	**0.64**	**-0.20**	**0.20**	**-0.18**	**-0.60**	**0.14**	-0.03	**-0.16**	-0.05
ΔEARN	**0.52**	**1.00**	-0.06	**0.48**	**0.12**	**0.22**	**0.18**	0.05	0.04	**-0.40**	-0.09	0.01	0.09
CF	**0.57**	**0.36**	**1.00**	**0.42**	**-0.51**	**-0.51**	**-0.55**	**-0.45**	**0.17**	**0.24**	**-0.14**	**-0.14**	0.08
ΔCF	**0.36**	**0.42**	**0.63**	**1.00**	**-0.13**	**-0.75**	**-0.36**	**-0.77**	**-0.15**	0.01	-0.05	0.00	0.02
ACC	**-0.19**	**-0.17**	**-0.92**	**-0.57**	**1.00**	**0.23**	**0.63**	**0.20**	**-0.69**	-0.07	0.09	-0.03	**-0.11**
ΔACC	-0.02	**0.24**	**-0.42**	**-0.78**	**0.49**	**1.00**	**0.54**	**0.90**	**0.20**	**-0.32**	-0.01	0.01	0.05
ΔWC	0.03	**-0.09**	**-0.66**	**-0.58**	**0.80**	**0.55**	**1.00**	**0.61**	0.09	0.08	0.09	0.05	0.03
ΔΔWC	-0.01	**0.25**	**-0.37**	**-0.72**	**0.44**	**0.95**	**0.53**	**1.00**	**0.27**	0.08	0.09	**0.12**	0.00
DEP	**0.40**	**0.20**	**0.65**	**0.18**	**-0.58**	-0.06	-0.02	-0.03	**1.00**	**0.19**	**-0.30**	**-0.14**	**0.21**
ΔDEP	0.02	**-0.23**	**0.07**	0.04	**-0.07**	**-0.20**	0.00	0.03	**0.12**	**1.00**	**-0.13**	**-0.19**	-0.07
ΔDT	**-0.07**	**-0.07**	**0.14**	**0.08**	**-0.20**	**-0.13**	-0.01	-0.04	0.02	0.02	**1.00**	**0.85**	**-0.16**
ΔΔDT	0.05	**0.26**	**0.23**	**0.32**	**-0.25**	**-0.16**	**-0.21**	0.05	0.03	-0.01	**0.42**	**1.00**	**-0.13**
RET	**0.31**	**0.32**	**0.20**	**0.20**	**-0.09**	0.01	**-0.07**	0.02	**0.10**	**-0.06**	**-0.10**	**0.09**	**1.00**

Table Description:
Table **1** shows descriptive statistics for a sample of Norwegian firms from 1992 to 2004. Panels A, B and C display the mean, first quarter (Q1), median, third quarter (Q3), standard deviation, and number of observations for the total sample, the positive earnings sample, and the negative earnings sample, respectively. Panel D lists correlation coefficients for the positive (negative) earnings sample below (above) the diagonal. Coefficients in bold denote a statistical significance at a 5% level using a two-sided test.
Variable definitions:
CF: Cash flow from operations. Cash flow = Earnings – Accruals.
EARN: Net earnings before extraordinary items.
ACC: Accruals = Change in working capital (ΔWC) – Change in deferred taxes (ΔDT) – Depreciation and impairment (DEP).
WC: Working capital = Total current assets – Cash – Total current liabilities + Interest bearing short term debt
Δ: Denotes yearly change in the variables.
All accounting variables are scaled by the market value of equity at 30 December in year t-1.
RET: Stock return (adjusted for dividends, splits, etc.), measured per 30 December.
SALES: Total sales and revenue (Million Norwegian Kroner).
TOT. ASSETS: Book value of total assets (Million Norwegian Kroner).
MV EQUITY: Market value of equity (Million Norwegian Kroner).

This study focuses on the difference between positive and negative earnings. Thus, descriptive statistics for these two sub-samples are also reported. 945 observations report profits, while 427 observations report losses (i.e., a loss frequency of 31%). Panels **B** and **C** display the statistics for the positive and the negative earnings sample, respectively. The positive earnings companies have both larger cash flow and larger accruals than the negative earnings sample. Depreciation is considerably higher for negative than for positive earnings companies. Not surprisingly, positive earnings companies have a much larger stock return than negative earnings companies. In fact, the stock return of the negative earnings sample is significantly negative on average. The three size variables reveal that negative earnings companies generally are much smaller than positive earnings companies (compare Hayn [2]). Non-tabulated results show that the means of all the earnings items (*CF*, *ACC*, Δ*WC*, *DEP*, Δ*DT*) as well as mean stock return (*RET*) are significantly different from each other in the positive and negative earnings samples (p-values<0.1%).

Panel **D** of Table **1** lists the correlation coefficients between the variables applied in the empirical study. The correlations are shown for both the positive and the negative earnings sample. In the positive earnings sample, there is a significant correlation between stock returns and earnings, cash flow, and accruals. Most of the individual accruals items are also statistically related to stock returns in this bivariate analysis. However, in the negative earnings sample, there seems to be low correlations between stock returns and the accounting variables. Both total earnings and total cash flow appear to be unrelated to stock returns. Accruals are negatively correlated with stock returns both in the positive and in the negative earnings sample. As expected, the accounting variables are highly interrelated in both samples. Nevertheless, many of the accruals items are statistically unrelated to positive earnings, but are significantly associated with negative earnings. Note that cash flow is generally correlated with all other accounting variables. Accruals and cash flows are significantly negatively correlated. This is further evidence that accruals, to some extent, balance out changes in cash flow and make total earnings a more stable figure than its separate components.

3. EMPIRICAL FINDINGS

The two sets of regression specifications described in sub-section 2.1 are run on the pooled sample. The explanatory power from the regressions is reported in Table **2**. This study focuses on the adjusted R^2 (hereafter R^2), but more detailed results from the regressions are reported in Table **4** of the Appendix.

Table **2** shows that the explanatory power from a standard Easton and Harris specification equals 7.61%. The R^2 increases to 9.36% as earnings are split into cash flow and aggregate accruals, and it increases further, to 10.79%, as accruals are disaggregated into major components. These findings are consistent with Barth, Cram, and Nelson [5]. However, when a dummy variable for negative earnings is included in the most aggregated specification, the R^2 is 13.70%. After the sign of earnings has been taken into account, the increase in explanatory power from disaggregation of earnings is rather modest. Maximum R^2 is 15.90% for the most disaggregated model. An *F*-test for restrictions on regression coefficients (Barth, Cram, and Nelson [5], Maddala [23]) is performed to test the significance of the differences in R^2. Using a significance level of 5 %, it turns out that all the R^2 values of Table **2** are significantly different from each other, both horizontally and vertically. However, Table **2** indicates that the sign of earnings effect dominates the disaggregation effect. When a dummy variable for negative earnings is introduced in the aggregated specification the explanatory power increases from 7.61% to 13.70%. This is far higher than the explanatory power of 10.79% for the disaggregated model that does not include a dummy variable for negative earnings.[4]

Table 2. Value Relevance of Earnings

Regression	Standard Specification	Dummy for Negative Earnings
Aggregate Earnings	7.61 %	13.70 %
Cash Flow + Accruals	9.36 %	14.18 %
Cash Flow + Accruals Items	10.79 %	15.90 %

Table Description

Table **2** describes the value relevance of earnings for a sample of Norwegian firms from 1992 to 2004. Value relevance is measured as the explanatory power, the adjusted R^2, from regression analysis. The column "Standard Specification" shows the explanatory power from the specification set $RET_{i,t} = \beta_0 + \beta_2 X_{i,t} + \beta_3 \Delta X_{i,t} + \varepsilon_{i,t}$, while the column "Dummy for Negative Earnings" shows the explanatory power from the specification set $RET_{i,t} = \beta_0 + \beta_1 D_{i,t} + \beta_2 X_{i,t} + \beta_3 \Delta X_{i,t} + \beta_4 X_{i,t} D_{i,t} + \beta_5 \Delta X_{i,t} D_{i,t} + \varepsilon_{i,t}$. $RET_{i,t}$ is stock return for company *i* in year *t*, while $X_{i,t}$ is a vector of earnings variables. In the regression "Aggregate Earnings" X = {EARN}, in "Cash Flow + Accruals" X = {CF, ACC}, and in "Cash Flow + Accruals Items" X = {CF, ΔWC, DEP, ΔDT}. EARN is earnings before extraordinary items, CF is cash flow from operations, ACC is total accruals, WC is working capital, DEP is depreciation and impairment, and DT is deferred taxes. D is a dummy variable equal to 1 when earnings are negative, 0 otherwise. Δ denotes yearly change in the variables.

The importance of the sign effect and the disaggregation effect are both substantial. The conclusion is that regardless of the aggregation level of earnings, the explanatory power of the regressions will increase if the sign of earnings is taken into account. Similarly, if the sign of earnings is taken into account, the explanatory power will generally increase if earnings are disaggregated into components. Table **2** presents clear evidence that one has to account for the sign of earnings and disaggregate earnings into items to extract the "full" value relevance of the income statement.

A lot of value relevance studies compare value relevance across sub-samples. Several of these studies do not account for the sign effect or the disaggregation effect. If the incremental increase in explanatory power from the sign and disaggregation effects is not constant across sub-samples, these two effects may affect the ranking as far as value relevance of different sub-samples is concerned. I test this possibility by splitting the sample in two, using 1999 as the cut-off year. The Norwegian Accounting Act of 1998 was put into effect in 1999. The Accounting Act of 1998 did not introduce any revolutionary changes in the Norwegian accounting system. The main principle is still historic cost with traditional principles for revenues and cost recognition, such that revenues should be earned and costs matched with the earned revenues for the period. The most notable change was probably that fair value for liquid short term financial instruments was introduced. The partial effect of such a change should normally be increased value relevance of the accounting figures. Table **3** reports the results of this analysis.

Table **3** shows that the value relevance as measured by the standard Easton and Harris specification was 6.52% before and 8.35% after the implementation of the new accounting act. This difference in explanatory power is not statistically significant according to the Cramer [24] test (*p*-value=0.51). However, if both the sign effect and the disaggregation effect are incorporated in the analysis, the explanatory power increases to 10.46% and 20.14%, respectively. The difference is now highly significant according to the Cramer-test (*p*-value=0.009)! Thus, the conclusion of whether or not the new accounting act has led to increasing value relevance of accounting information is dependent upon the regression specification being employed. The "true" level of value relevance is the explanatory power of the regression specification that incorporates both the sign and the disaggregation effect. This is the maximum proportion of the variance in stock returns that one is able to explain using only accounting variables as explanatory variables in the regression analysis.

Table 3. Value Relevance Before and After New Accounting Act

Panel A. Before 1999

Regression	Standard Specification	Dummy for Negative Earnings
Aggregate Earnings	6.52 %	8.44 %
Cash Flow + Accruals	6.73 %	9.08 %
Cash Flow + Accruals Items	7.09 %	10.46 %

Panel B. After 1998

Regression	Standard Specification	Dummy for Negative Earnings
Aggregate Earnings	8.35 %	16.53 %
Cash Flow + Accruals	10.19 %	16.84 %
Cash Flow + Accruals Items	12.75 %	20.14 %

Table Description

Table **3** describes the value relevance of earnings for a sample of Norwegian firms from 1992 to 2004. Panel A shows the results for 1992 to 1998 and Panel B shows the results for 1999 to 2004. The regression specifications are described in Table **2**.

[4] The robustness of this conclusion is tested using bootstrapping, where 945 observations are drawn from the positive earnings sample, while 427 observations are drawn from the negative earnings sample. The procedure is repeated 10,000 times. Each observation can be drawn several times in each simulation. The increase in explanatory power from introducing a dummy variable for negative earnings is larger than the increase from disaggregating earnings in more than 90% of the cases.

Table **3** also shows that if one had applied a regression specification that only accounted for the disaggregation effect, the value relevance before and after the new accounting act is 7.09% and 12.75%, respectively. If only the sign effect is accounted for, the corresponding numbers are 8.44% and 16.53%. These increases in explanatory power are also substantial. In this case, it is sufficient to account for either the sign effect or the disaggregation effect to reach the conclusion that the value relevance has increased significantly after the introduction of the new accounting act. However, the largest increase is found when both effects are incorporated simultaneously.

All the reported results are from standard OLS regressions, since the findings then can be related to previous research. However, several alternative econometric methods have been applied to study the robustness of the conclusions. The findings from the alternative tests are similar to the ones reported. For instance, if random effect panel data techniques (see Green [25]) replace standard OLS, the difference in explanatory power between the standard Easton and Harris specification and the disaggregated specification which also incorporates the sign effect is 119% (adjusted R^2 of respectively 16.94% and 7.74%). If instead fixed effect models (Green [25]) are applied, the difference is 77%. Once again, the value relevance is severely understated if standard value relevance regressions are applied.[5]

Other untabulated robustness checks include the use of control variables in the regression analyses. The methodology described in Collins, Maydew, and Weiss [8] is then used to estimate the incremental value relevance of the earnings variables.[6] The results are practically identical to the ones reported in Tables **2** and **3**. This is also the case if raw stock return is replaced by excess return (compare Dechow [26]).[7] In Table **3**, R^2 of different sub-samples is compared. This methodology has been criticized by for instance Brown, Kin, and Lys [27] and Gu [28]. Specifically, Brown, Kin, and Lys [27] and Gu [28] show that scale differences and/or sampling variations might lead to R^2 differences even if the underlying economic relation is identical in two samples. The analysis of the intertemporal differences in value relevance is repeated using scale-adjusted RMSE as the measure of explanatory power, a methodology recommended by Gu [28]. Scale-adjusted RMSE gives exactly the same results as the ones reported in Table **3**.

4. CONCLUSION

Prior research has shown that the value relevance of earnings increases as earnings are disaggregated and the sign of earnings is accounted for in the empirical analysis. This study shows that these two effects are incremental to each other: value relevance increases substantially if the sign effect is incorporated in the analysis even if earnings have already been disaggregated. And vice versa: there is a significant increase in value relevance when earnings are disaggregated even if the sign of earnings has already been taken into account in the regression analysis. The most important contribution of this paper is to show that the increase in value relevance from incorporating the sign effect and the disaggregation effect may vary dramatically between sub-samples. Whether this result would have affected conclusions from prior research comparing value relevance in different time periods, countries and industries, as well as studies analyzing value relevance under different accounting standards, is an issue that is left for future research.

ACKNOWLEDGEMENTS

I would like to thank Frøystein Gjesdal, Kjell H. Knivsflå, John C. Langli, Peder Fredslund-Møller, Frank Thinggaard, Ken Peasnell and two anonymous reviewers for helpful suggestions and comments.

APPENDIX

Table 4. Detailed Results from Regression Analyses

Panel A. Aggregate Earnings

	Standard Specification		Dummy for Negative Earnings	
	Coefficient	**t-Statistic**	**Coefficient**	**t-Statistic**
EARN	**0.53**	3.65	**1.26**	4.35
ΔEARN	**0.62**	3.51	**0.89**	3.91
EARN*D			**-1.41**	-4.18
ΔEARN*D			**-0.67**	-2.43
D			**-0.23**	-4.55
Constant	**0.16**	8.73	**0.15**	4.86
Adj. R^2	7.61 %		13.70 %	
n	1372		1372	

Panel B. Cash Flow + Accruals

	Standard Specification		Dummy for Negative Earnings	
	Coefficient	**t-Statistic**	**Coefficient**	**t-Statistic**
CF	**0.78**	5.45	**1.21**	4.13
ΔCF	**0.51**	3.07	**0.96**	3.79
ACC	**0.30**	2.07	**1.24**	3.49
ΔACC	**0.68**	4.20	**0.82**	3.68
CF*D			**-0.95**	-2.54
ΔCF*D			**-0.77**	-2.61
ACC*D			**-1.49**	-3.78
ΔACC*D			-0.46	-1.59
D			**-0.26**	-5.01
Constant	**0.11**	4.84	**0.15**	4.88
Adj. R^2	9.36 %		14.18 %	
n	1372		1372	

[5] All robustness checks are available from the author upon request.

[6] The control variables include company size, book-to-market ratio, intangible asset intensity, extraordinary items, risk free interest rate, and stock price volatility.

[7] Excess return is estimated as the individual stock returns minus the market-wide return on Oslo Stock Exchange.

(Appendix) contd…..

Panel C. Cash Flow + Accruals Items

	Standard Specification		Dummy for Negative Earnings	
	Coefficient	**t-Statistic**	**Coefficient**	**t-Statistic**
CF	**0.88**	6.10	**1.37**	4.47
ΔCF	**0.37**	2.24	**0.77**	2.89
ΔWC	**0.65**	3.09	**1.24**	3.85
ΔΔWC	**0.44**	2.63	**0.71**	3.34
DEP	-0.15	-0.89	**-1.51**	-3.50
ΔDEP	**-0.81**	-3.19	-0.98	-1.56
ΔDT	**-2.45**	-2.93	**-3.15**	-2.92
ΔΔDT	0.47	0.83	0.08	0.13
CF*D			**-1.01**	-2.71
ΔCF*D			**-0.77**	-2.55
ΔWC*D			-0.81	-1.95
ΔΔWC*D			**-0.81**	-2.96
DEP*D			**2.07**	4.40
ΔDEP*D			0.33	0.47
ΔDT*D			2.73	1.88
ΔΔDT*D			-0.87	-0.85
D			**-0.30**	-5.58
Constant	**0.08**	3.21	**0.16**	5.03
Adj. R^2	10.79 %		15.90 %	
n	1372		1372	
Mean VIF	2.26		7.57	

Table Description:
Table **4** displays details of the regression analyses presented in Table **2**. The table describes the value relevance of earnings for a sample of Norwegian firms from 1992 to 2004. It summarizes the regression coefficients (Coefficient), White-adjusted t-values (t-statistic), total explanatory power (adj. R^2) and number of observations (*n*) for the total sample. Possible multicollinearity is examined by mean variance inflation factor (mean VIF – only reported for the most disaggregated earnings specification). Coefficients in **bold** denote a statistical significance at a 5% level using a two sided test.

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Received: August 21, 2009 Revised: January 6, 2009 Accepted: January 27, 2009